Еx

Name:_

Math~2163 Jeff Mermin's section, Final exam, December 11 On the essay questions (# 2–12) write legibly in complete sentences, in such a way that I can easily tell what you are doing and why.

You may or may not find the following tables helpful.

1. $\int u^{4} du = \frac{u^{4+1}}{u} + C, x \neq -1$ 21. $\int u^{4} du = \frac{h}{u} + 1 + C, x \neq -1$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 23. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 24. $\int \frac{1}{u \ln u} du = \ln \ln u + C$ 25. $\int \frac{1}{u \ln u} du = -\cos u + C$ 26. $\int \frac{1}{u \ln u} du = \ln \cos u + C$ 26. $\int \frac{1}{u \ln u} du = \ln \cos u + C$ 26. $\int \frac{1}{u \ln u} du = \ln \cos u + C$ 27. $\int \frac{1}{u \ln u} du = \ln \cos u + C$ 28. $\int \frac{1}{c ch^{2}} du = \frac{1}{u \ln u} + C$ 29. $\int c ch u du = \ln \ln \ln u + C$ 29. $\int c ch u du = \ln \ln \ln u + C$ 29. $\int c ch u du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln \ln u + C$ 29. $\int s ch du = \ln u + C$ 20. $\int s ch^{2} u du = -ch + $	Basic Porms	- (r	
$ \begin{aligned} \sum_{i=1}^{n} \frac{1}{2} \sin i \left[\frac{1}$					
$\begin{split} \sum_{k=1}^{k} \int dx_{k} - \frac{1}{2} e^{-k_{k}} dx_{k} - 1$		$23. \int \frac{1}{u \ln u} du = \ln \ln u + C$	44. $\int \sin^n u du =$	$-\frac{1}{n}\sin^{n-1}u\cos u + \frac{n-1}{n}\int\sin^{n-2}udu$	67. $\int \sqrt{a^2 - u^2} du = \frac{u}{2} \sqrt{a^2 - u^2} + \frac{a^2}{2} \sin^{-1} \frac{u}{a} + C$
$\begin{split} \int \int dx dx = \frac{1}{2} dx^{-1} + \frac{1}{2} dx^{$		Hyperbolic Forms	45. $\int \cos^n u du =$	$=\frac{1}{n}\cos^{n-1}u\sin u + \frac{n-1}{n}\int\cos^{n-2}udu$	68. $\int u^2 \sqrt{a^2 - u^2} du = \frac{u}{8} (2u^2 - a^2) \sqrt{a^2 - u^2} + \frac{a^4}{8} \sin^{-1} \frac{u}{a} + C$
$ \int \frac{dx}{dx} dx = x + C $ $ \int \int \frac{dx}{dx} d$,	$24. \int \sinh u du = \cosh u + C$	46. $\int \tan^n u du =$	$=\frac{1}{n-1}\tan^{n-1}u - \int \tan^{n-2}u du$	69. $\int \frac{\sqrt{a^2 - u^2}}{u} du = \sqrt{a^2 - u^2} - a \ln \left \frac{a + \sqrt{a^2 - u^2}}{u} \right + C$
$ \begin{aligned} b \int dx dx - dx = C \\ b \int dx dx - dx = 0 \\ c \int dx dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx - dx = 0 \\ c \int dx dx dx - dx =$,	$25. \int \cosh u du = \sinh u + C$			$70 \int \sqrt{a^2 - u^2} du = -\frac{1}{\sqrt{a^2 - u^2}} - \sin^{-1} \frac{u}{u} + C$
$ \begin{array}{cccccccccccccccccccccccccccccccccccc$	5	$26. \int \tanh u du = \ln \cosh u + C$			j u- u u
$\begin{aligned} \mathbf{k} \int d^{2} d\mathbf{k} d\mathbf{k} - d\mathbf{k} + \mathbf{k} \\ \mathbf{k} \int d^{2} d\mathbf{k} - d\mathbf{k} + d\mathbf{k} \\ \mathbf{k} \int d^{2} d\mathbf{k} - d\mathbf{k} + d\mathbf{k} \\ \mathbf{k} \int d^{2} d\mathbf{k} \\ \mathbf{k} - d\mathbf{k} \\ \mathbf{k} \end{pmatrix} = \left\{ \begin{array}{c} \mathbf{k} \int d^{2} d\mathbf{k} \\ \mathbf{k} \\ \mathbf{k}$,	27. $\int \coth u du = \ln \sinh u + C$			$\sqrt{a^2 - u^2}$
$\begin{aligned} \ln \int \cos(\omega - \cos \omega) \leq C \\ \ln \int \sin(\omega + i) \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E $,	50. $\int \sin au \sin b$	$u du = \frac{\sin(a - b)u}{2(a - b)u} - \frac{\sin(a + b)u}{2(a + b)u} + C$	
$\begin{aligned} \ln \int \cos(\omega - \cos \omega) \leq C \\ \ln \int \sin(\omega + i) \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le C \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E \\ \ln \int \sin(\omega + i) = \lim_{k \to \infty} (-\infty) + i \le E $			51. $\int \cos au \cos b$	$u(du) = \frac{\sin(a-b)u}{2(a+b)} + \frac{\sin(a+b)u}{2(a+b)} + C$	
$\begin{aligned} \int \sin x - \sin x + c & x \\ x \\ \int \sin x - \sin x + c & x \\ x \\ \ \int \sin x - \sin x + c & x \\ \ \int \sin x - \sin $, ,	5	52. $\int \sin au \cos b$	2(a - b) = 2(a + b) $u du = -\frac{\cos(a - b)u}{\cos(a - b)u} - \frac{\cos(a + b)u}{\cos(a + b)u} + C$,
$\begin{aligned} \begin{split} & \int \sin x \sin x \sin x + C & \text{if } \int \sin x \sin x \sin x + C & \text{if } \int \sin x \sin x \sin x + C & \text{if } \int \sin x \sin x + x \sin x + C & \text{if } \int \sin $	5	$31. \int \operatorname{csch}^2 u du = -\coth u + C$			75. $\int \frac{du}{(a^2 - u^2)^{3/2}} = \frac{u}{a^2 \sqrt{a^2 - u^2}} + C$
$\begin{aligned} \begin{array}{l} & \int \int \sin dx - \sin \sin dx - \sin dx + C \\ & \text{If } \int \sin dx - \sin dx - C \\ & \text$	· · · · · · · · · · · · · · · · · · ·	1			
$\begin{aligned} \begin{split} & \prod_{j=1}^{k-1} \int \cos dx = \ln $,	33. $\int \operatorname{csch} u \operatorname{coth} u du = -\operatorname{csch} u + C$,		
$\begin{split} \int \frac{d}{dx^2 + u^2} = u^{-1} \frac{1}{4} + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + u^2 + C \\ IS \int \frac{d^2 + u^2}{dx^2 + u^2} = \frac{1}{4} u^2 + u^2 + \frac{1}{4} u^2 + \frac{1}{4} u^2 + \frac{1}{4} u^2 + u^2 + \frac{1}{4} u^2 + $,	Trigonometric Forms	5	<i>v</i>	5
$\begin{aligned} \mathbf{x} \int_{q^2 = q^2}^{q^2 = q^2} \mathbf{x} ^2 + c \\ \mathbf{x} \int_{q^2 = q^$	5	34. $\int \sin^2 u du = \frac{1}{2}u - \frac{1}{4}\sin 2u + C$			
$\begin{aligned} \int \frac{d^2}{d^2 + 2} & = 1 \\ \int \frac{d^2}{d^2 +$		- · · · · ·	57. $\int \sin^n u \cos^n \sin^{n-1} \sin^n u i m $	u du $u \cos^{m+1} u = \frac{n-1}{1} \int \sin^{n-2} u \cos^m u du$	8 0
Explorement and updation of provides $1 = 0$ by $1 = 0$ 1 = 1 $1 = 0$ $1 =$	16. $\int \frac{au}{a^2 + u^2} = \frac{1}{a} \tan^{-1} \frac{u}{a} + C$	· · · ·		$n + m$ $n + m \int dm$ $n = 0$ $n = 1$	
$\begin{split} \mathbf{E} \int d^{n} d^{n} d^{n} = \frac{1}{2} d^{n} d^{n} d^{n} = \frac{1}{2} \int d^{n} d^{n} d^{n} d^{n}} \\ \mathbf{E} \int d^{n} d^{n} d^{n} d^{n} = \frac{1}{2} d^{n} d^{n} d^{n} d^{n}} \\ \mathbf{E} \int d^{n} d^{n} d^{n} d^{n} d^{n} d^{n} d^{n} d^{n} d^{n}} \\ \mathbf{E} \int d^{n} d^{n}} \\ \mathbf{E} \int d^{n} d^{n}} \\ \mathbf{E} \int d^{n} d^{$	Exponential and Logarithmic Forms	$37. \int \cot^2 u du = -\cot u - u + C$	=	$+m$ $+m$ $+m$ $\int \sin^{n} u \cos^{m} u du$	79. $\int \frac{\sqrt{u^2 - a^2}}{u} du = -\frac{\sqrt{u^2 - a^2}}{u} + \ln \left u + \sqrt{u^2 - a^2} \right + C$
$\begin{aligned} \ \int e^{-\pi k} dx = \frac{1}{2} e^{\pi k} - \frac{1}{2} \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} + h(x) + e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} dx \\ \ \int e^{\pi k} dx = \frac{1}{2} e^{\pi k} dx \\ \ \int e^{\pi k} d$	17. $\int ue^{au} du = \frac{1}{a^2}(au-1)e^{au} + C$	$38. \int \sin^3 u du = -\frac{1}{3}(2 + \sin^2 u) \cos u + C$	Inverse Trigo	nometric Forms	
$\begin{split} \Re \int \frac{d\sigma}{dx+z} \left[\sin x \partial x + \sin x \partial x + \frac{d}{dx+z} \right] \left[\sin x \partial x + \sin x \partial x + \sin x \partial x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x - \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x - \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x - \frac{1}{2} \left[\sin x \partial x + \sin x + \frac{1}{2} \left[\sin x - \frac{1}{2} \left[\sin x $	18. $\int u^n e^{au} du = \frac{1}{a} u^n e^{au} - \frac{n}{a} \int u^{n-1} e^{au} du$	39. $\int \cos^3 u du = \frac{1}{3} (2 + \cos^2 u) \sin u + C$	58. $\int \sin^{-1} u du$	$= u \sin^{-1} u + \sqrt{1 - u^2} + C$	81. $\int \frac{u^2 du}{\sqrt{u^2 - a^2}} = \frac{u}{2}\sqrt{u^2 - a^2} + \frac{a^2}{2}\ln\left u + \sqrt{u^2 - a^2}\right + C$
$\begin{split} & \sum_{n} \int \frac{d^{n}}{dx} dx dx - \frac{d^{n}}{dx} - \frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \sum_{n} \sin x + C \\ & 3i \int \sin x di = -\frac{1}{2} dx^{2} - \frac{1}{2} dx^{2} - \frac$	19. $\int e^{au} \sin bu du = \frac{e^{au}}{a^2 + b^2} (a \sin bu - b \cos bu) + C$	40. $\int \tan^3 u du = \frac{1}{2} \tan^2 u + \ln \cos u + C$	59. $\int \cos^{-1} u du$	$= u \cos^{-1} u - \sqrt{1 - u^2} + C$	82. $\int \frac{du}{2\sqrt{2-a^2}} = \frac{\sqrt{u^2 - a^2}}{a^2 u} + C$
$\begin{aligned} 31. \int \mathbf{u} \cdot d\mathbf{u} = u \mathbf{u} - u \mathbf{u} - \frac{u}{2} - \frac{u}{2} \mathbf{u} - \frac{u}{2} -$	20. $\int e^{au} \cos bu du = \frac{e^{au}}{a^2 + b^2} (a \cos bu + b \sin bu) + C$	41. $\int \cot^3 u du = -\frac{1}{2} \cot^2 u - \ln \sin u + C$	$60. \int \tan^{-1} u du$	$= u \tan^{-1} u - \frac{1}{2} \ln(1 + u^2) + C$	
$\int \int u u r r r du = \frac{x^{2} + 1}{2} u u r r r r \frac{x}{2} + 2$ $46 \int \int v^{2} u u r r r du = \frac{x^{2} + 1}{2} u (r + \sqrt{x^{2} + u^{2}}) + 2$ $46 \int u^{2} u u r r r du = \frac{x^{2} + 1}{2} u (r + \sqrt{x^{2} + u^{2}}) + 2$ $46 \int u^{2} u u r r r du = \frac{x}{1 + 1} \left[\frac{x^{4+1} u r r r}{\sqrt{1 + u^{2}}} \right] + \frac{x}{r} - 1$ $46 \int u^{2} u u r r r du = \frac{x}{1 + 1} \left[\frac{x^{4+1} u r r r}{\sqrt{1 + u^{2}}} \right] + \frac{x}{r} - 1$ $46 \int u^{2} u u r r r du = \frac{x}{1 + 1} \left[\frac{x^{4+1} u r r r}{\sqrt{1 + u^{2}}} \right] + \frac{x}{r} - 1$ $46 \int \frac{\sqrt{2^{2} + u^{2}}}{u} u = \frac{1}{u} \left[\frac{\sqrt{2^{2} + u^{2}}}{u} - \frac{x}{2} u (u + \sqrt{2^{2} + u^{2}}) + C$ $46 \int \sqrt{x^{2} u r r r} u = \frac{1}{u} + \left[\frac{x^{4+1} u r r}{1 + u^{2}} \right] + \frac{x^{4+1} u r}{r} \right] + \frac{x^{4-1} u }{r}$ $46 \int \sqrt{2^{4} u r r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{u} - \frac{x}{2} u (u + \sqrt{2^{4} + u^{2}}) + C$ $46 \int \sqrt{x^{4} u r r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{1 + u^{2}} \right] + \frac{x^{4} u r}{r} - 1$ $46 \int \sqrt{2^{4} u r r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{1 + u^{2}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{1 + u^{2}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{1 + u^{2}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{2^{4} + u^{2}}}{1 + u^{2}} \right] + L \left[\frac{1}{u} + \sqrt{x^{2} + u^{2}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u} \left[\frac{\sqrt{x^{4} + u^{2}}}{1 + u^{2}} \right] + L \left[\frac{1}{u} + \sqrt{x^{2} + u^{2}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u^{4}} \left[\frac{\sqrt{x^{4} + u^{2}}}{1 + u^{4}} \right] + C$ $46 \int \sqrt{x^{4} u r^{2}} u = \frac{1}{u^{4}} \left[\frac{\sqrt{x^{4} + u^{2}}}{1 + u^{4}} \right] + C$ $47 \int \frac{\sqrt{u^{4} u r^{2}}}{1 + u^{4} u^{$	$21. \int \ln u du = u \ln u - u + C$	42. $\int \sec^3 u du = \frac{1}{2} \sec u \tan u + \frac{1}{2} \ln \sec u + \tan u + C$	61. $\int u \sin^{-1} u d$	$u = \frac{2u^2 - 1}{4} \sin^{-1} u + \frac{u\sqrt{1 - u^2}}{4} + C$	- , · · · · · · · · · · · · · · · · · ·
$\begin{aligned} 8k \int \frac{dx}{dx^2 + x^2} = \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{x^2}{2} + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k \int \frac{dx}{dx^2 + x^2} = \frac{1}{2} \ln(x + \sqrt{x^2 + x^2}) + C \\ 8k $			62. $\int u \cos^{-1} u d$	$u = \frac{2u^2 - 1}{\cos^{-1}u} - \frac{u\sqrt{1 - u^2}}{1 + c} + c$	Forms involving $\sqrt{a^2 + u^2}$, $a > 0$
$\begin{aligned} 4\int \int s^{a} \sin^{2} u dx & = \frac{1}{a+1} \left[s^{a+1} u^{a} - s - \int \frac{s^{a+1}}{(s^{a}+u)^{a}} \right], & s \neq -1 \\ 6\int \int s^{a} \cos^{2} u dx & = \frac{1}{a+1} \left[s^{a+1} u^{a} - s - \int \frac{s^{a+1}}{(s^{a}+u)^{a}} \right], & s \neq -1 \\ 6\int \int s^{a} \cos^{2} u dx & = \frac{1}{a+1} \left[s^{a+1} u^{a+1} - s - \int \frac{s^{a+1}}{(s^{a}+u)^{a}} \right], & s \neq -1 \\ 6\int \int s^{a} \cos^{2} u dx & = \frac{1}{a+1} \left[s^{a+1} u^{a+1} - s - \int \frac{s^{a+1}}{(s^{a}+u)^{a}} \right], & s \neq -1 \\ 6\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} = \sqrt{s^{a}+s^{a}} - s \left[s - \sqrt{s^{a}+s^{a}} + s \right] + C \\ 6\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}+1} \left[s^{a+1} u^{a+1} - s - \int \frac{s^{a+1}}{(s^{a}+u)^{a}} \right], & s \neq -1 \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \sqrt{s^{a}+s^{a}} + s \left[s + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a^{a}} \left[s^{a} + \sqrt{s^{a}+s^{a}} \right] + C \\ 8\int \int \frac{s^{a}}{s^{a}} \frac{dx}{u} & = \frac{1}{a$			5	4 4	
$6s. \int u^{a} \cos^{-1} u du = \frac{1}{u+1} \left[u^{a+1} \cos^{-1} u du = \frac{1}{\sqrt{1+u^{2}}} \left[u^{a+1} \frac{du^{2}}{\sqrt{1+u^{2}}} \right], n \neq -1 \\ 6s. \int u^{a} \frac{du^{a}}{\sqrt{u^{2}+u^{2}}} = u \left[\frac{1+\sqrt{2^{2}+u^{2}}}{u} \right] + C \\ 6s. \int u^{a} \tan^{-1} u du = \frac{1}{u+1} \left[\frac{u^{a+1} u^{a}}{\sqrt{1+u^{2}}} \right], n \neq -1 \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = u \left[u + \sqrt{2^{2}+u^{2}} \right] + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u} \left[u + \sqrt{2^{2}+u^{2}} \right] + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{2^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{u^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{u^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{u^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{u^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u \left(u + \sqrt{u^{2}+u^{2}} \right) + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u + \sqrt{u^{2}+u^{2}} \right] + C \\ 8s. \int \frac{du}{\sqrt{u^{2}+u^{2}}} = \frac{1}{u^{2}} \left[u + \sqrt{u^{2}+u^{2}} \right$			5	2 2	
$64. \int u^{A} \tan^{-1} u du = \frac{1}{n+1} \left[u^{n+1} \tan^{-1} u - \int \frac{u^{n+1} du}{1+x^{2}} \right], n \neq -1 \qquad \text{sr.} \int \frac{\sqrt{a^{2} + u^{2}}}{u^{2}} du = -\frac{\sqrt{a^{2} + u^{2}}}{u} + \ln(u + \sqrt{a^{2} + u^{2}}) + C$ $88. \int \frac{du}{u^{2}} = \ln(u + \sqrt{a^{2} + u^{2}}) + C$ $191. \int u^{n} \sqrt{u + 4m} du$ $89. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \sqrt{a^{2} + u^{2}} + \frac{1}{2} \left[u + \sqrt{a^{2} + u^{2}} \right] + C$ $192. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \sqrt{a^{2} + u^{2}} + \frac{1}{2} \left[u + \sqrt{a^{2} + u^{2}} \right] + C$ $193. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{u} + u \left(u + \sqrt{a^{2} + u^{2}} \right) + C$ $193. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{u^{2} + u^{2}} + C$ $193. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{u^{2} + u^{2}} + C$ $193. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{u^{2} + u^{2}} + C$ $194. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{u^{2} + u^{2}} + C$ $194. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $195. \int \frac{du}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $196. \int \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $196. \int \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $197. \int \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{u^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $196. \int \frac{\sqrt{a^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{u^{2} + u^{2}}}{\sqrt{a^{2} + u^{2}}} + C$ $197. \int \frac{\sqrt{a^{2} + u^{2}}}{(u + bu)^{2} + u^{2}}} + C$ $198. \int \frac{du}{u^{2} + u^{2}}} = \frac{1}{2} \ln \left \frac{u^{2} + u^{2}}}{u^{2} + u^{2}}} + C$ $198. \int \frac{du}{u^{2} + u^{2}}} = $					8
$88. \int \frac{du}{\sqrt{a^2 + u^2}} = \ln(a + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u^2}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(a + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u^2}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(u + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{u^2}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{u^2}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u$	x		$65. \int u^n \cos^{-1} u$	$du = \frac{1}{n+1} \left[u^{n+1} \cos^{-1} u + \int \frac{u^{n+1} du}{\sqrt{1-u^2}} \right], n \neq -1$	86. $\int \frac{\sqrt{a^2 + u^2}}{u} du = \sqrt{a^2 + u^2} - a \ln \left \frac{a + \sqrt{a^2 + u^2}}{u} \right + C$
$88. \int \frac{du}{\sqrt{a^2 + u^2}} = \ln(a + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u^2}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(a + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u^2}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(u + \sqrt{a^2 + u^2}) + C \\ 89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + \right + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{\sqrt{a^2 + u^2}}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{u^2}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{u^2}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u^2} + C \\ 89. \int \frac{1}{u^2 + u^2} = \frac{1}{a^2 + u^2} + \frac{1}{a^2 + u$			66. $\int u^n \tan^{-1} u$	$du = \frac{1}{n+1} \left[u^{n+1} \tan^{-1} u - \int \frac{u^{n+1} du}{1+u^2} \right], n \neq -1$	87. $\int \frac{\sqrt{a^2 + u^2}}{2} du = -\frac{\sqrt{a^2 + u^2}}{2} + \ln(u + \sqrt{a^2 + u^2}) + C$
$89. \int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u}{2}\sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(u + \sqrt{a^2 + u^2}) + C$ $90. \int \frac{u}{u\sqrt{a^2 + u^2}} = -\frac{1}{a} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + C$ $90. \int \frac{du}{u\sqrt{a^2 + u^2}} = -\frac{1}{a} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + C$ $91. \int \frac{du}{u\sqrt{a^2 + u^2}} = -\frac{1}{a^2} \ln \left \frac{\sqrt{a^2 + u^2}}{u} + C$ $92. \int \frac{du}{u^2\sqrt{a^2 + u^2}} = -\frac{\sqrt{a^2 + u^2}}{a^2} + C$ $93. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{u}{\sqrt{a^2 + u^2}} + C$ $94. \int \frac{du}{u\sqrt{a^2 + u^2}} = \frac{u}{a^2\sqrt{a^2 + u^2}} + C$ $95. \int \frac{du}{u^4 + bu} = \frac{1}{a} \ln \left \frac{u + bu}{u} \right + C$ $95. \int \frac{du}{u^4 + bu} = -\frac{1}{a} \ln \left \frac{u + bu}{u} \right + C$ $95. \int \frac{du}{u^4 + bu} = -\frac{1}{a} \ln \left \frac{u + bu}{u} \right + C$ $95. \int \frac{du}{u^4 + bu} = -\frac{1}{a} \ln \left \frac{u + bu}{u} \right + C$ $95. \int \frac{du}{u(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{u(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{au} + \frac{b}{b^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + C$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$ $95. \int \frac{du}{(a + bu)^2} = -\frac{1}{a^2} \ln a + bu + bc$,		J u∸ u
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$8s. \int \frac{du}{\sqrt{a^2 + u^2}} = \frac{1}{2} \sqrt{a^4 + u^2 - \frac{1}{2}} \ln \left \frac{du + du^2 + u^2}{u^2 + u^2} \right + C$ $90. \int \frac{du}{u\sqrt{a^2 + u^2}} = -\frac{1}{a} \ln \left \frac{\sqrt{a^2 + u^2}}{u^2 + u^2} \right + C$ $91. \int \frac{du}{u\sqrt{a^2 + u^2}} = -\frac{1}{a} \ln \left \frac{\sqrt{a^2 + u^2}}{u^2 + u^2} \right + C$ $92. \int \frac{du}{(a^2 + u^2)^{3/2}} = \frac{u}{a^2\sqrt{a^2 + u^2}} + C$ $93. \int \frac{du}{(a^2 + u^2)^{3/2}} = \frac{u}{a^2\sqrt{a^2 + u^2}} + C$ $94. \int \frac{d^2u}{(a^2 + u^2)^{3/2}} = \frac{1}{b^2} (a + bu - a \ln a + bu) + C$ $95. \int \frac{du}{u^2 + bu} = -\frac{1}{a^2 + bu} + \frac{1}{b^2} \ln a + bu + C$ $96. \int \frac{du}{(a^2 + u^2)^{3/2}} = \frac{1}{a^2 + b^2} + \frac{1}{b^2} \ln a + bu + C$ $97. \int \frac{udu}{(a + bu)^2} = \frac{1}{a^2} \ln \left \frac{1}{a^2 + bu} - \frac{1}{a^2 + bu} \right + C$ $98. \int \frac{udu}{(a + bu)^2} = \frac{1}{a^2} \ln \left \frac{1}{a^2 + bu} \right + C$ $98. \int \frac{udu}{(a + bu)^2} = \frac{1}{a^2} \ln \left \frac{1}{a^2 + bu} \right + C$ $98. \int \frac{udu}{(a + bu)^2} = \frac{1}{a^2} \ln \left \frac{1}{a^2 + bu} \right + C$ $98. \int \frac{udu}{(a + bu)^2} = \frac{1}{a^2 + bu} + \frac{1}{b^2} \ln a + bu + C$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{a^2} \ln \left \frac{a + bu}{u^2} \right + C$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{b^2} (a + bu) - \frac{a^2}{a^2 + bu} - \frac{1}{a^2 + bu} + bu + bu + bu$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{b^2} (a + bu) - \frac{a^2}{a^2 + bu} - \frac{1}{a^2 + bu} + bu + bu$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{b^2} (a + bu) - \frac{a^2}{a^2 + bu} + bu + bu + bu + bu$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{b^2} (a + bu) - \frac{a^2}{a^2 + bu} + bu + bu + bu + bu$ $99. \int \frac{u^2du}{(a + bu)^2} = \frac{1}{b^2} (a + bu) - \frac{a^2}{a^2 + bu} - \frac{a^2}{a^2 + bu} + bu + bu + bu + bu + bu + bu + b$		- Va 1 -			
$90. \int \frac{u}{u\sqrt{a^{2}} + a^{2}} = -\frac{1}{a} \ln \left \frac{\sqrt{a^{4} - u} + a}{a} \right + C$ $103. \int \frac{u^{a} du}{\sqrt{a + bu}} = \frac{2u^{a}\sqrt{a + bu}}{b(2n + 1)} - \frac{2na}{b(2n + 1)} \int \frac{u^{a - 1} du}{\sqrt{a + bu}}$ $91. \int \frac{du}{a^{2}\sqrt{a^{2} + u^{2}}} = -\frac{\sqrt{a^{2} + u^{2}}}{a^{2} u} + C$ $104. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu} + \sqrt{a}} \right + C, \text{if } a > 0$ $92. \int \frac{du}{(a^{2} + u^{2})^{3/2}} = \frac{u}{a^{2}\sqrt{a^{2} + u^{2}}} + C$ $104. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu} + \sqrt{a}} \right + C, \text{if } a < 0$ $92. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu} + \sqrt{a}} \right + C$ $103. \int \frac{\sqrt{a + bu}}{\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu}} \right + C$ $104. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu}} \right + C$ $105. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{\sqrt{a + bu}}{\sqrt{a + bu}} \right + C$ $105. \int \frac{du}{a\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{u}{\sqrt{a + bu}} \right + C$ $106. \int \frac{\sqrt{a + bu}}{\sqrt{a + bu}} = \frac{1}{\sqrt{a}} \ln \left \frac{u}{\sqrt{a + bu}} \right + C$ $107. \int \frac{\sqrt{a + bu}}{a^{4} + bu}} = \frac{1}{2} \ln \left \frac{u}{a + bu} \right + C$ $108. \int \sqrt{2au - u^{2}} du = \frac{u}{-2} \sqrt{2au - u^{2}} + \frac{a^{2}}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $109. \int \frac{u\sqrt{2au - u^{2}}}{(a + bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{a}{a^{2} + bu} - \frac{1}{a^{2} + bu} \right + C$ $109. \int \frac{u\sqrt{2au - u^{2}}}{(a + bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{a}{a^{2} + bu} - \frac{1}{a^{2} + bu} \right) + C$ $100. \int \frac{\sqrt{a - u^{2}}}{(a - u^{2})^{2} + a^{2} + bu} + \frac{1}{a^{2}} \ln a + bu + C$ $109. \int \frac{u\sqrt{a - u^{2}}}{(a + bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{a}{a^{2} + bu} \right) + C$ $100. \int \frac{du}{\sqrt{a - u^{2}}} = \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $100. \int \frac{\sqrt{a - u^{2}}}{(a - bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{1}{a^{2} + bu} \right) + C$ $100. \int \frac{\sqrt{a - u^{2}}}{(a - bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{1}{a^{2} + bu} \right) + C$ $100. \int \frac{\sqrt{a - u^{2}}}{(a - bu)^{2}} = \frac{1}{b^{1}} \left(a + bu - \frac{1}{a^{2} + bu} \right) + C$ $100. \int \frac{\sqrt{a - u^{2}}}{(a - bu)^{2}} = \frac{1}{a^{2}} \ln \frac{1}{a^{2} + bu} + C$ $10. \int \frac{1}{\sqrt{a - u^{2}}} = \frac{1}{a^{2}} \ln \frac{1}{a^{2} + bu} + C$ $10. \int \frac{1}{\sqrt{a - u^{2}}}$		89. $\int \frac{u^2 du}{\sqrt{a^2 + u^2}} = \frac{u}{2} \sqrt{a^2 + u^2} - \frac{a^2}{2} \ln(u + \sqrt{a^2})$	$(\frac{1}{2} + u^2) + C$		va + ou au
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$93. \int \frac{u^{2} du}{a + bu} = \frac{1}{b^{2}} (a + bu - a \ln a + bu) + C$ $94. \int \frac{u^{2} du}{a + bu} = \frac{1}{2b^{3}} [(a + bu)^{2} - 4a(a + bu) + 2a^{2} \ln a + bu] + C$ $94. \int \frac{u^{2} du}{a + bu} = \frac{1}{2b^{3}} [(a + bu)^{2} - 4a(a + bu) + 2a^{2} \ln a + bu] + C$ $95. \int \frac{du}{a(a + bu)} = \frac{1}{a} \ln \left \frac{u}{a + bu} \right + C$ $96. \int \frac{du}{a^{2}(a + bu)^{2}} = \frac{1}{-a} + \frac{b}{a^{2}} \ln \left \frac{a + bu}{a} \right + C$ $97. \int \frac{u du}{(a + bu)^{2}} = \frac{a}{b^{2}(a + bu)} + \frac{1}{b^{2}} \ln a + bu + C$ $98. \int \frac{du}{u(a + bu)^{2}} = \frac{1}{a(a + bu)} - \frac{1}{a^{2}} \ln \left \frac{a + bu}{u} \right + C$ $99. \int \frac{u^{2} du}{(a + bu)^{2}} = \frac{1}{b^{5}} (a + bu - \frac{a^{2}}{a + bu} - 2a \ln a + bu) + C$ $106. \int \frac{\sqrt{a + bu}}{u} du = 2\sqrt{a + bu} + a \int \frac{du}{u\sqrt{a + bu}}$ $107. \int \frac{\sqrt{a + bu}}{u} du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u\sqrt{a + bu}}$ $107. \int \frac{\sqrt{a + bu}}{u} du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u\sqrt{a + bu}}$ $107. \int \frac{\sqrt{a + bu}}{u} du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u\sqrt{a + bu}}$ $108. \int \sqrt{2au - u^{2}}, a > 0$ $108. \int \sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{2au - u^{2}}} + \frac{a^{2}}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $109. \int \sqrt{2au - u^{2}} du$ $109. \int \sqrt{2au - u^{2}} du$ $100. \int \frac{du}{du - u} du = \frac{2u^{2} - au - 3a^{2}}{2} \sqrt{2au - u^{2}} + \frac{a^{2}}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $109. \int \sqrt{2au - u^{2}} du$ $100. \int \frac{du}{du - u} du = \frac{2u^{2} - au - 3a^{2}}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$		Forms Involving $a + bu$		105. $\int \frac{du}{u} = -\frac{\sqrt{a+bu}}{\sqrt{a+bu}} = -\frac{b(2n-3)}{2a(n-1)}$	$\int \frac{du}{u \pi - 1} \frac{du}{(u \pi - 1)^2}$
94. $\int \frac{u^{2} du}{a + bu} = \frac{1}{2b^{2}} [(a + bu)^{2} - 4a(a + bu) + 2a^{2} \ln (a + bu)] + C$ 107. $\int \frac{\sqrt{a + bu}}{u^{2}} du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u\sqrt{a + bu}}$ 95. $\int \frac{du}{a(a + bu)} = \frac{1}{au} \frac{a}{a + bu} + C$ 107. $\int \frac{\sqrt{a + bu}}{u^{2}} du = -\frac{\sqrt{a + bu}}{u} + \frac{b}{2} \int \frac{du}{u\sqrt{a + bu}}$ 96. $\int \frac{du}{a^{2}(a + bu)} = -\frac{1}{au} + \frac{b}{a^{2}} \ln \frac{a + bu}{u} + C$ 108. $\int \sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 108. $\int \sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int \sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{u - a}{2\sqrt{au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{2u^{2} - au - 3a^{2}}{\sqrt{2au - u^{2}}}, a > 0$ 109. $\int u\sqrt{2au - u^{2}} du = \frac{2u^{2} - au - 3a^{2}}{\sqrt{2au - u^{2}}}, a > 0$ 109. $\int \frac{u^{2} du}{(a + bu)^{2}} = \frac{1}{b^{5}} (a + bu - \frac{a}{a + bu} - 2a \ln a + bu) + C$ 110. $\int \frac{du}{\sqrt{2au - u^{2}}} = \cos^{-1} (\frac{u - u}{a}) + C$		93. $\int \frac{u du}{a + bu} = \frac{1}{b^2} (a + bu - a \ln a + bu) + C$			<i>y u yu yu</i>
95. $\int \frac{du}{u(a+bu)} = \frac{1}{a} \ln \left \frac{u}{a+bu} \right + C$ 96. $\int \frac{du}{u^2(a+bu)} = -\frac{1}{au} + \frac{b}{a^2} \ln \left \frac{a+bu}{u} \right + C$ 97. $\int \frac{u}{(a+bu)^2} = \frac{1}{au} + \frac{b}{a^2} \ln \left \frac{a+bu}{u} \right + C$ 98. $\int \frac{du}{u(a+bu)^2} = \frac{1}{a(a+bu)} - \frac{1}{a^2} \ln \left \frac{a+bu}{u} \right + C$ 99. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 99. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 91. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 92. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 93. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 94. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 95. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 96. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 97. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 98. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 99. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ 100. $\int \frac{u^2}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$	x	94. $\int \frac{u^2 du}{du} = \frac{1}{a^{1/2}} [(a+bu)^2 - 4a(a+bu) + 2$	$a^2 \ln a + bu] + C$		
$96. \int \frac{du}{u^2(a+bu)} = \frac{1}{-au} + \frac{b}{a^2} \ln \left \frac{a+bu}{u} \right + C$ $97. \int \frac{u}{(a+bu)^2} = \frac{a}{b^2(a+bu)} + \frac{1}{b^2} \ln a+bu + C$ $98. \int \frac{du}{(a+bu)^2} = \frac{1}{a(a+bu)} - \frac{1}{a^2} \ln \left \frac{a+bu}{u} \right + C$ $99. \int \frac{u^2du}{(a+bu)^2} = \frac{1}{b^3} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C$ $100. \int \frac{\sqrt{2au - u^2}}{a} u = \frac{u-a}{2}\sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a-u}{a} \right) + C$ $109. \int \frac{\sqrt{2au - u^2}}{6} du = \frac{2u^2 - au - 3a^2}{6}\sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a-u}{a} \right) + C$ $100. \int \frac{du}{\sqrt{2au - u^2}} u = \frac{2u^2 - au - 3a^2}{6}\sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a-u}{a} \right) + C$ $100. \int \frac{du}{\sqrt{2au - u^2}} u = \frac{2u^2 - au - 3a^2}{2}\sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a-u}{a} \right) + C$	4	9 0 1 00 20	-		u
$97. \int \frac{u du}{(a + bu)^2} = \frac{a}{b^2(a + bu)} + \frac{b}{b^2} \ln a + bu + C$ $98. \int \frac{du}{u(a + bu)^2} = \frac{1}{a(a + bu)} - \frac{1}{a^2} \ln \left \frac{a + bu}{u} \right + C$ $99. \int \frac{u^2 du}{(a + bu)^2} = \frac{1}{b^3} \left(a + bu - \frac{a^2}{a + bu} - 2a \ln a + bu \right) + C$ $100. \int \sqrt{u du} - u^2 du = \frac{1}{a} - \frac{1}{2} \sqrt{u du} - \frac{1}{a} + \frac{1}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $100. \int \sqrt{u du} - u^2 du = \frac{1}{a} - \frac{1}{2} \sqrt{u du} - \frac{1}{a} + \frac{1}{2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $100. \int \sqrt{u du} - \frac{1}{a^2} - \frac{1}{a^2} \cos^{-1} \left(\frac{a - u}{a} \right) + C$ $110. \int \sqrt{\frac{du}{2au - u^2}} = \cos^{-1} \left(\frac{a - u}{a} \right) + C$					
$98. \int \frac{du}{u(a+bu)^2} = \frac{1}{a(a+bu)} - \frac{1}{a^2} \ln \left \frac{a+bu}{u} \right + C = \frac{109}{2a^2 - au - 3a^2} \sqrt{2au - u^2} + \frac{a^2}{2} \cos^{-1} \left(\frac{a-u}{a} \right) + C$ $99. \int \frac{u^2 du}{(a+bu)^2} = \frac{1}{b^5} \left(a+bu - \frac{a^2}{a+bu} - 2a \ln a+bu \right) + C = 110. \int \frac{du}{\sqrt{2au - u^2}} = \cos^{-1} \left(\frac{a-u}{a} \right) + C$			+ C	108. $\int \sqrt{2au - u^2} du = \frac{u - a}{2} \sqrt{2au - u^2} + \frac{a^2}{2} \cos \theta$	$x^{-1}\left(\frac{a-u}{a}\right) + C$
$99. \int \frac{u^2 du}{(a+bu)^2} = \frac{1}{b^3} \left(a + bu - \frac{a^2}{a+bu} - 2a\ln a+bu \right) + C$ $110. \int \frac{du}{\sqrt{2au-u^2}} = \cos^{-1} \left(\frac{a-u}{a} \right) + C$				109. $\int u \sqrt{2au - u^2} du$	
$\int \sqrt{2au-u^2}$				0 2	$\left(\frac{a-a}{a}\right) + C$
100. $\int u\sqrt{a+bu}du = \frac{2}{15b^2}(3bu - 2a)(a+bu)^{3/2} + C$ 111. $\int \frac{du}{u\sqrt{2au - u^2}} = -\frac{\sqrt{2au - u^2}}{au} + C$		2 (a bit) b (/	* V2uu - u	
		100. $\int u\sqrt{a+bu}du = \frac{2}{15b^2}(3bu-2a)(a+bu)^{3/2}$	2 + C	111. $\int \frac{du}{u\sqrt{2au - u^2}} = -\frac{\sqrt{2au - u^2}}{au} + C$	

1. (45 points)Indicate whether the following statements are true or false. ("True" means "Always true", "false" means "sometimes false".) No justification is necessary on this problem. Write the entire word "True" or "False". Illegible or abbreviated answers will receive no credit.

In these statements, **x**, **y**, and **z** are vectors, **u** is a unit vector, *a*, *b*, *c*, *d*, and *L* are real numbers, *t* is a parameter, *x*, *y*, *z*, *r*, θ , ρ , and ϕ are the usual rectangular, polar, or spherical coordinates for \mathbb{R}^3 , *C* : $\mathbf{r}(t) = \langle x(t), y(t), z(t) \rangle$ is a smooth curve in \mathbb{R}^3 , F = F(x, y, z) is a smooth function on \mathbb{R}^3 , *f* and *g* are smooth functions on their domains, which are subsets of \mathbb{R}^2 or \mathbb{R}^3 , and *R* is a closed and bounded region contained in the domains of *f* and *g*. *dA* and *dV* mean what they mean in the text.

(a)
$$\iint_R f(x,y) + g(x,y)dA = \iint_R f(x,y)dA + \iint_R g(x,y)dA.$$

(b)
$$\frac{\partial}{\partial x}(f+g) = \frac{\partial f}{\partial x} + \frac{\partial g}{\partial x}.$$

- (c) The vector $\langle dx, dy, dz \rangle$ is normal to the graph of z = f(x, y).
- (d) If $\lim_{x\to 0} f(x,0) = \lim_{y\to 0} f(0,y) = L$, then $\lim_{(x,y)\to(0,0)} f(x,y) = L$.

(e)
$$\frac{d\mathbf{r}}{dt} = \left\langle \frac{dx}{dt}, \frac{dy}{dt}, \frac{dz}{dt} \right\rangle$$
.

- (f) The lines $\langle x, y, z \rangle = \langle -2, 3, 2 \rangle + \langle 3, 4, -4 \rangle t$ and $\langle x, y, z \rangle = \langle 0, -1, -4 \rangle + \langle -5, 0, -3 \rangle t$ intersect at the point (-5, -1, 6).
- (g) If f(x,y) = x + y, then $|D_{\mathbf{u}}(f)(x,y)| \le 2$ for all x and y.
- (h) $\frac{\partial}{\partial x}(fg) = \frac{\partial f}{\partial x}\frac{\partial g}{\partial x}$.

(i)
$$\|\mathbf{x}\| + \|\mathbf{y}\| = \|\mathbf{x} + \mathbf{y}\|.$$

(j) If z is defined implicitly as a function of x and y by F(x, y, z) = 0, then $\partial z = \frac{\partial F}{\partial F}$

$$\frac{\partial z}{\partial x} = \frac{\frac{\partial 1}{\partial x}}{\frac{\partial F}{\partial z}}.$$

(k) If S is the sphere of radius one about the origin, then $\iiint_{S} f dV = \int_{\phi=0}^{\phi=2\pi} \int_{\theta=0}^{\theta=2\pi} \int_{\rho=0}^{\rho=1} f \rho^{2} \sin \phi \, d\rho d\theta d\phi.$

(1)
$$(\mathbf{x} \times \mathbf{y}) \times \mathbf{z} = \mathbf{x} \times (\mathbf{y} \times \mathbf{z}).$$

(m)
$$\int_a^b \int_c^d f(x,y) dx dy = \int_a^b \int_c^d f(x,y) dy dx.$$

(n) If
$$f(x,y) \ge 0$$
 for all $(x,y) \in R$, then $\iint_R f dA \ge 0$.

- (o) If (a, b) is a critical point of f, $f_{xx}(a, b) = 1$, and $f_{yy}(a, b) = -1$, then (a, b) is a saddle point of f.
- 2. (10 points) Let $\mathbf{x} = \langle -3, 0, 2 \rangle$ and $\mathbf{y} = \langle 0, -2, 2 \rangle$.
 - (a) Find $\mathbf{x} \cdot \mathbf{y}$.
 - (b) Find $\|\mathbf{x}\|$.

- 3. (25 points) Let P = (-1,3,0), Q = (-1,1,-2), R = (4,-2,0), and S = (4,0,2).
 - (a) Verify that PQRS is a parallelogram.

(b) Find the area of *PQRS*. (We have seen at least three ways to answer this question in class. Most of you will not use an integral; you should state any relevant formulas before using them, and your answer should be a number. If you use double integrals, you may leave your answer in terms of iterated integrals. If you use single integrals, you may leave your answer as an integral or integrals, provided that you define the integrand and the limits of integration unambiguously, and write a sentence explaining why your answer is correct.)

(c) Find an equation for the plane containing PQRS.

- 4. (35 points) Consider the curve $C : \mathbf{r}(t) = (t, t^2, t^3)$.
 - (a) Find a parametrization of the tangent line to C at the point P = (-1, 1, -1).

(b) Find the arc length of C from P = (-1, 1, -1) to Q = (2, 4, 8). (Your answer should be a definite integral. Simplify the integrand and the limits of integration as much as you can, but **do not evaluate**.)

5. (15 points) Find $\frac{dy}{dx}$, if

$$y = (3x^5 - 7x^2 + 4)^3 - (3x^5 - 7x^2 + 4)^2 \left(\frac{x^4 + \sqrt{x}}{x^2}\right) + (3x^5 - 7x^2 + 4) \left(\frac{x^4 + \sqrt{x}}{x^2}\right)^2 - \left(\frac{x^4 + \sqrt{x}}{x^2}\right)^3 + \frac{3x^5 - 7x^2 + 4}{\frac{x^4 + \sqrt{x}}{x^2}}.$$

(If you use a technique from multivariable calculus, you may leave your answer in any form that an Algebra II student would understand. If you use only techniques from Calculus I, you must simplify your answer completely.)

- 6. (25 points) Consider the function $F(x, y, z) = xe^{-yz}$.
 - (a) Compute ∇F .

(b) Find an equation for the tangent plane to the level surface F(x, y, z) = 1 at the point (1, 2, 0).

7. (15 points) Some values of a continuous function f(x, y) on the rectangle $R = \{0 \le x \le 30, 0 \le y \le 20\}$ are given in the table below. (Apparently f is hard to compute, because some values are unknown). Estimate the value of $\iint_R f(x,y) dA$ using a Riemann sum with at least six summands. Leave your answer as a Riemann sum.

	x											
		0	5	10	15	20	25	30				
	0	2	?	4	?	?	?	8				
	5	2	?	4	?	8	10	?				
y	10	?	?	?	8	?	?	?				
	15	2	3	?	?	6	8	7				
	20	2	?	2	2	?	?	4				

- 8. (40 points) Express each of the following as an iterated integral in an appropriate coordinate system. If you use coordinates other than rectangular, polar, cylindrical, or spherical, you must define them. Do not evaluate.
 - (a) $\iiint_R x^2 + y^2 + z^2 dx dy dz$, where R is the region defined by the inequalities $\{x \ge 0, z \le 0, x^2 + y^2 + z^2 \le 4\}$.

(b) $\iiint_R y \, dx dy dz$, where R is the region defined by the inequalities $x^2 + y^2 \le z \le 5$ and $0 \le y \le 1$. 9. (20 points) Find $\int_C \langle e^x(z+1), -\cos y, e^x \rangle \cdot d\mathbf{s}$, where C is the curve that starts at (1,0,0), moves clockwise around the unit circle to (0,1,0), then moves along the curve $(x, y, z) = (t, 1 - t, t^2 - t)$ to its ending point at (1,0,0).

Name:__

10. (20 points) Consider the following problem:

Find the maximum and minimum value of x^2y+x+y , subject to the constraint xy = 4.

Assuming that maximum and minimum values exist, write down a system of equations whose solutions will be useful in solving this problem. Then explain how those solutions will help in determining the desired values. **Do not solve the problem.**

11. (Extra credit: 10 points) Prove that the optimization problem in #10 has no solution.

12. (Extra credit: 10 points) In the space remaining on this page, write the largest integer you can. You do not have to simplify, as, for example, "10³" may take up less space than "1000". However, I should be able (at least in theory) to determine the precise value of your number with no ambiguity or reference to the experiential universe (so, for example, "the number of stars in the sky" is right out), so you may need to use some space defining your notation.