

Practice Exam for midterm II

1. A large tank is designed with ends in the shape of the region between the curves $y = \frac{1}{2}x^2$ and $y = 12$, measured in feet. Find the hydrostatic force on one end of the tank if it is filled to a depth of 8 ft with gasoline. (Assume the gasoline's density is 42.0 lb/ft^3 .)
2. Calculate the moments M_x , M_y and the center of mass of the region bounded by $x^2 + y^2 = 9$ in the first quadrant.
3. Find a formula for the general term a_n of the sequence

$$\left\{ \frac{1}{e^2}, -\frac{4}{e^3}, \frac{9}{e^4}, -\frac{16}{e^5}, \dots \right\}$$

Then evaluate the limit of this sequence.

4. Use the integral test to determine whether the series is convergent or divergent:

$$\sum_{n=1}^{\infty} \frac{1}{8n+1}$$

5. Determine whether the series is convergent or divergent. If it is convergent, find its sum:

$$\sum_{n=1}^{\infty} \frac{2}{n^2 + 3n + 2}$$

6. Express the number as a ratio of integers:

$$3.\bar{2} = 3.2222\dots$$

7. Test whether the series is convergent or divergent:

$$\sum_{n=1}^{\infty} \frac{n}{n^4 + 1}$$

8. Test the following series for convergence or divergence. Then give an estimate of $|R_{10}| = |S - S_{10}|$.

$$\frac{7}{\ln 2} - \frac{7}{\ln 3} + \frac{7}{\ln 4} - \frac{7}{\ln 5} + \frac{7}{\ln 6} - \dots$$

9. Determine whether $\sum_{n=1}^{\infty} \frac{\sin(4n)}{4^n}$ is absolutely convergent, conditionally convergent, or divergent.
10. Determine whether $\sum_{n=1}^{\infty} \left(\frac{n^2+1}{2n^2+1} \right)^n$ is absolutely convergent, conditionally convergent, or divergent.
11. Determine whether the series $\sum_{n=1}^{\infty} \frac{(-1)^{n+1}}{\sqrt[4]{n}}$ is absolutely convergent, conditionally convergent, or divergent.
12. Determine whether the series $\sum_{n=1}^{\infty} \frac{n!}{100^n}$ is absolutely convergent, conditionally convergent, or divergent.