Math 2233
Homework Set 9

1. Compute the Laplace transform of the following functions.

(a) $f(t) = t$

(b) $f(t) = t^n$

2. Use the formula
$$\sin(bt) = \frac{e^{ibt} - e^{-ibt}}{2i}$$
to compute the Laplace transform of $\sin(bt)$.

3. Invert the following Laplace transforms.

(a) $\mathcal{L}[f] = \dfrac{3}{s^2 + 4}$

(b) $\mathcal{L}[f] = \dfrac{2}{s^2 + 3s - 4}$

(c) $\mathcal{L}[f] = \dfrac{2s + 2}{s^2 + 2s + 5}$

(d) $\mathcal{L}[f] = \dfrac{2s + 1}{s^2 - 2s + 2}$

(e) $\mathcal{L}[f] = \dfrac{1 - 2s}{s^2 + 4s + 5}$

4. Use the Laplace transform to solve the given initial value problem.

(a) $y'' - y' - 6y = 0$ ; $y(0) = 1$ , $y'(0) = -1$

(b) $y'' - 2y' + 2y = 0$ ; $y(0) = 0$ , $y'(0) = 1$

(c) $y'' - 2y' - 2y = 0$ ; $y(0) = 2$ , $y'(0) = 0$

(d) $y'' + 2y' + y = 4e^{-t}$ ; $y(0) = 2$ , $y'(0) = -1$