Fall 2022

Problem A

Find the inverse Laplace transform of the following transforms.

1)
$$\frac{3}{s^2+4}$$
.

4)
$$\frac{3s}{s^2 - s - 6}$$
.

8)
$$\frac{8s^2 - 4s + 12}{s(s^2 + 4)}$$
.

2)
$$\frac{4}{(s-1)^3}$$
.

5)
$$\frac{2s+2}{s^2+2s+5}$$
.
6) $\frac{2s-3}{s^2-4}$.

9)
$$\frac{2s^2 + 4s + 6}{(s+1)^2(s-1)}.$$

3)
$$\frac{2}{s^2+3s+5}$$
.

7)
$$\frac{2s+1}{s^2-2s+2}$$
.

10)
$$\frac{s+1}{s(s-1)^2}$$
.

Problem B

Find the solutions to the following initial value problems.

1)
$$y'' - y' - 6y = 0$$
, with $y(0) = 1$, $y'(0) = -1$.

1)
$$y'' - y' - 6y = 0$$
, with $y(0) = 1$, $y'(0) = -1$.
4) $y'' + \omega^2 y = \cos 2t$, with $\omega^2 \neq 4$, $y(0) = 1$, $y'(0) = 0$.

2)
$$y'' + 3y' + 2y = 0$$
, with $y(0) = 1$, $y'(0) = 0$.

5)
$$y'' + 2y' + y = 4e^{-t}$$
, with $y(0) = 2$, $y'(0) = -1$.

3)
$$y'' + 2y' + 5y = 0$$
, with $y(0) = 2$, $y'(0) = 1$.