Inverse Laplace Transforms Part II

1. Find the following Inverse Laplace Transform.

$\mathcal{L}^{-1}\left\{\frac{1}{s^3+5s}\right\}$

2. Find the following Inverse Laplace Transform.

$\mathcal{L}^{-1}\left\{\frac{2s-4}{(s^2+s)(s^2+1)}\right\}$

3. Use the Laplace Transform to solve the following initial-value problem.

$\frac{dy}{dt} - y = 1$, $y(0) = 0$

4. Use the Laplace Transform to solve the following initial-value problem.

$y' + 6y = e^{4t}$, $y(0) = 2$

5. Use the Laplace Transform to solve the following initial-value problem.

$y'' + 5y' + 4y = 0$, $y(0) = 1$, $y'(0) = 0$

6. Use the Laplace Transform to solve the following initial-value problem.

$y'' + y = \sqrt{2}sin(\sqrt{2}t)$, $y(0) = 10$, $y'(0) = 0$

Common Inverse Laplace Transforms

$t^n = \mathcal{L}^{-1}\left\{\frac{n!}{s^{n+1}}\right\}$

$e^{at} = \mathcal{L}^{-1}\left\{\frac{1}{s-a}\right\}$

$sin(k \cdot t) = \mathcal{L}^{-1}\left\{\frac{k}{s^2+k^2}\right\}$

$cos(k \cdot t) = \mathcal{L}^{-1}\left\{\frac{s}{s^2+k^2}\right\}$