Differential Equations
Problem Set 12
The Laplace Transform:
The Inverse Transforms

Obtain the following inverse transforms.

1. $\mathscr{L}^{-1}\left\{\frac{a}{s(s+a)}\right\} = 1 - e^{-at}$
2. $\mathscr{L}^{-1}\left\{\frac{a^3}{s(s+a)^3}\right\} = 1 - \left(1 + at + \frac{1}{2}a^2t^2\right)e^{-at}$
3. $\mathscr{L}^{-1}\left\{\frac{k^2}{s(s^2+k^2)}\right\} = 1 - \cos kt$
4. $\mathscr{L}^{-1}\left\{\frac{a-b}{(s-a)(s-b)}\right\} = e^{at} - e^{bt}\ (a > b)$
5. $\mathscr{L}^{-1}\left\{\frac{b^2-a^2}{(s^2+a^2)(s^2+b^2)}\right\} = \frac{1}{a}\sin at - \frac{1}{b}\sin bt$