Differential Equations **Homework 10** **Name:**
MWF 10-10:50 or MWF 11-11:50

Show your work! Answers without supporting work will not be given credit. Print this assignment and write your work in the spaces provided.

1. Find $\mathcal{L}^{-1}\left(\dfrac{15s}{s^2 - s - 6}\right)$

2. (a) Consider the ode $y'' - y' - 6y = 0$, $y(0) = 1$, $y'(0) = -1$. Find the Laplace transform of $y(t)$. That is, find $\mathcal{L}(y(t)) = Y(s)$. $Y(S) =$

(b) Find the Laplace inverse of $Y(s)$. That is, solve for $y(t)$. $y(t) =$

3. Solve $y'' - 2y' + 2y = \cos(t)$, $y(0) = 1$, $y'(0) = 0$,using the Laplace transform method.

$Y(S) =$

$y(t) =$

4. Solve $y'' + 2y' + y = 4e^{-t}$, $y(0) = 2$, $y'(0) = -1$, using Laplace transform method.

$Y(S) =$

$y(t) =$

5. Solve $y'''' - y = 0$, $y(0) = 1$, $y'(0) = 0$, $y''(0) = 1$, $y'''(0) = 0$, using the Laplace transform method. [1] Note that this is one of the methods of solving higher order equations.

$Y(S) =$ [ ]

$y(t) =$ [ ]

[1] Hints: $\mathcal{L}(y'''') = s^4Y(s) - s^3y(0) - s^2y'(0) - sy''(0) - y'''(0)$. Also use the identity $a^4 - b^4 = (a-b)(a+b)(a^2+b^2)$.