Differential Equations Pre-final Take home
Please write up the answers to these exercises and bring them to class on Tuesday.

1)(4 points) Please compute and simplify the convolution of e^t with t^2.

2)(4 points) Please compute and simplify the Laplace transform of $t^n\ e^{at}$. This is problem 18 of section 6.2.

3)(4 points) Please use the Laplace Transform to solve the initial value problem $y'' - \omega y = \cos 2t$, where $\omega^2 \neq 4, y(0) = 1, y'(0) = 0$.

4)(4 points) Please compute the inverse Laplace transform of $\frac{2s-3}{s^2+2s+10}$.

5)(4 points) Use the Laplace Transform to solve the initial value problem $y'' + 3y' + 2y = \cos \alpha t$, where y(0)=0 and y'(0)=1. You may represent the answer as a convolution.

6)(4 points) Please compute Laplace transform of $e^{ct} f(t)$ in terms of F(s), the Laplace transform of f(t), without citing Theorem 6.3.2.