In the following problems, you can use any properties that were derived in lecture.

1. Find the Laplace transform of the following functions:

a. $f(t) = t^6 e^{5t}$

b. $f(t) = t \cos 3t$

2. Find the Laplace transform of the solution to the follow initial value problems.

a. $y'' - 5y' - 6y = t^2 + 7, \qquad y(0) = 1,\ y'(0) = 0$

b. $y''' + y'' + y' + y = 0, \qquad y(0) = 4,\ y'(0) = 0,\ y''(0) = -2$

c. $y'' + y = \begin{cases} t, & 0 \le t < 1 \\ 0, & 1 \le t \end{cases}, \qquad y(0) = 0,\ y'(0) = 2$