MAT274 HW10

DUE DECEMBER 7 (OR SUBMIT IN MONDAY CLASS).
READINGS: §7.1—7.3 OF EDWARDS & PENNEY

1. Let $f(t) = t^n$ where n is a positive integer. Apply **definition** and perform a detailed calculation to find its Laplace transform $F(s)$.
2. Use the Table of Laplace Transforms and the property
$$\mathcal{L}\{(-t)^n f(t)\} = \frac{d^n}{ds^n}\mathcal{L}\{f(t)\}$$
to find
$$\mathcal{L}^{-1}\left\{\frac{s}{(s^2+9)^2}\right\}$$
Hint: think about $\frac{d}{ds}\frac{1}{s^2+9}$.
3. Consider an undamped spring-mass system with spring constant 64. At time $t = 0$, the mass is released at displacement +2 with zero initial velocity -4. Use **Laplace transform** to find the particular solution. You may use the Table of Laplace Transforms directly.