Written Assignment 4
Due Monday, October 31th

1. (2.7, #6 and 8) (a) Draw a function f such that f' is positive and decreasing.

   (b) Draw a function f such that f' is negative and decreasing (that is, becoming more negative).

2. (2.7, # 32 and 34) The following equations give the positions as functions of time of objects tossed from towers in various exotic places in the solar system. For each,

   (i) Find the velocity and acceleration of the object as functions of time.

   (ii) How high was the tower?

   (iii) Was the object thrown up or down?

   (iv) How many times larger/smaller is the acceleration compared to Earth's (9.8m/sec^2)?

   (a) An object on Mercury that follows $s(t) = -0.325t^2 - 20t$.

   (b) An object on the Sun that follows $s(t) = -137t^2 + 20t + 500$.

3. Let $F(t) = t^3e^2t$. Find the intervals where F is concave up and concave down. Also find the critical points and inflection points.

4. An important function in engineering and physics is the sinc function (read "sink"), defined by
$$\text{sinc}(x) = \frac{\sin(x)}{x}.$$
We make the convention that $\text{sinc}(0) = 0$ (which is inspired by problem #5 on Written Assignment 1). [Warning: you cannot cancel the x to get $\text{sinc}(x) = \frac{\sin}{1}$. That would be a sin!]

   (a) Find the derivative of $\text{sinc}(x)$.

   (b) Use the graph of the derivative to estimate three critical points of $\text{sinc}(x)$. [There are infinitely many, but find the first three closest to 0.]