Notes 1.6 – 1.8 Name:_____

Show all relevant work!

You may use a calculator to verify solutions, but not to provide them.

1. A rocket is launched from the ground with an initial velocity of 140 ft/sec. Assuming it travels straight up and ignoring air resistance (or any other kind of reality), answer the following questions:

   (a) Write an equation for the height of the rocket, h, as a function of time, t.

   (b) Find $h(2)$ and interpret the meaning of your result.

   (c) When does the rocket return to the earth?

   (d) What is the highest altitude the rocket reaches and how long does it take to get there?

2. What is the minimum initial velocity needed to propel a rocket to an altitude of 500 feet?

3. A bullet is shot straight up and returns to the ground 34 seconds later. What was the initial velocity of the bullet?

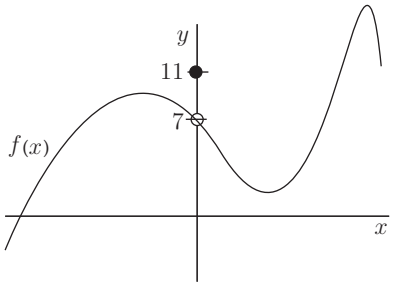
4. (a) Is the function $g(x) = \dfrac{e^{-x}}{\cos x}$ continuous on $[0, \pi]$?

(b) Is $k(x) = \sqrt{1 + x^2}$ continuous on $(-\infty, \infty)$?

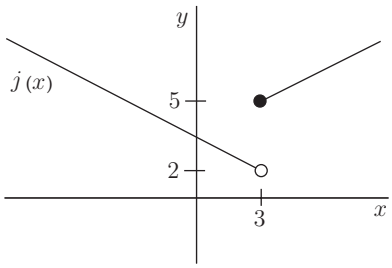
5. Find the value for k that will make $f(x)$ continuous.

$$f(x) = \begin{cases} kx^2 - 5 & : \quad x \leq 2 \\ 3x + 4 & : \quad x > 2 \end{cases}$$

6. Find the limit $\lim_{x \to 0} f(x)$ (if it exists).



7. Find the limit $\lim_{x \to 3} j(x)$ (if it exists).



8. Find the limit $\lim_{x \to 0} k(x)$

$$k(x) = \begin{cases} \cos x & : \quad x \leq 0 \\ 2 - x & : \quad x > 0 \end{cases}$$

Sketch the graph to confirm your answer.