Panther ID: ——————————————— **NAME:** ————————————————————

MAC 2311: Worksheet Jan. 31, 2017

1. For $f(x) = x^2 - 2x$, sketch the following secant lines and find their slopes:
(a) Between the points $(1, f(1))$ and $(2, f(2))$;

(b) Between the points $(1, f(1))$ and $(0, f(0))$.

2. Find the equation of the line tangent to the given graph at the indicated point:
(a) $f(x) = x^2 - 2x$ at $x_0 = 1$;

(b) $f(x) = x^2 - 2x$ at an arbitrary point x_0;

(c) $f(x) = \sqrt{2x + 3}$ at $x_0 = 2$;

(d) $f(x) = \sqrt{2x + 3}$ at an arbitrary point x_0.

3. The height of a ball in feet above the ground at time t seconds is given by $s(t) = -32t^2 + 14t$.

(a) Find the average velocity of the ball in the time interval $[1, 3]$ seconds.

(b) Find the instantaneous velocity of the ball at the moment $t_0 = 1$ second.

4. Use the definition to find the derivatives $f'(x)$ of the given functions:

(a) $f(x) = 4x + 2$ \hspace{6cm} (b) $f(x) = \frac{1}{x^2}$

5. Is the function $f(x) = |x|$ differentiable at $x_0 = 0$? Explain why or why not by showing that the limit defining $f'(0)$ does or does not exist.