**Math 141** **Quiz 1** **09/26/2014**

Name: _____

Answer the questions on the quiz and not on a separate sheet of paper. Show your work for full credit.

(10 points) 1. The graph of $f(x)$ is given below. Draw the graph of $f'(x)$ and identify the intervals of $f(x)$ that are increasing and decreasing.

(10 points) 2. Show that the there is a root of the equation on the **interval** $(1, 2)$:

$$\sin(x) = x^2 - x.$$

(10 points) 3. Explain why the function is discontinuous at $a = 3$.

$$f(x) = \begin{cases} \dfrac{2x^2 - 5x - 3}{x - 3} & \text{if } x \neq 3 \\ 6 & \text{if } x = 3 \end{cases}$$

(10 points) 4. Find the equation of the tangent line of $y = x^2$ at the **point** $(1, 1)$.

(10 points) 5. Sketch the graph of the function that satisfies all of the given conditions:

- $f'(0) = f'(4) = 0$;
- $f'(x) > 0$ if $x < 0$;
- $f'(x) < 0$ if $0 < x < 4$ or if $x > 4$;
- $f''(x) > 0$ if $2 < x < 4$;
- $f''(x) < 0$ if $x < 2$ or $x > 4$.