MATH 10250 Quiz 4   **NAME:**
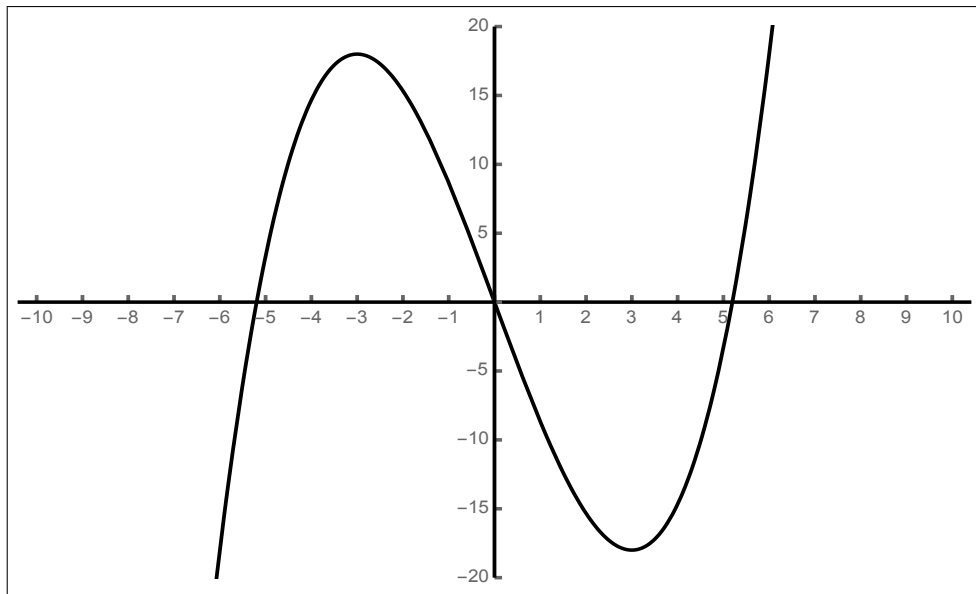
July 10, 2018

You have **10 minutes** for the quiz. Please <u>show your work</u> and <u>write neatly</u>.
NO CALCULATOR please!

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1. Given the graph of f

- The interval(s) on which f is **decreasing** is: $(-3, 3)$
- The interval(s) on which f is **increasing** is: $(-\infty, -3) \cup (3, \infty)$
- The interval(s) on which f is **concave upward** is: $(0, \infty)$
- The interval(s) on which f is **concave downward** is: $(-\infty, 0)$
- List the x-coordinates of all the **critical points** of f: $x = -3, 3$

- List all the **inflection points** of f: $(0, 0)$

Recall: A **critical point** of a function $f(x)$ is a point $(a, f(a))$ on the graph of f(x) such that $f'(a) = 0$ or $f'(a)$ is undefined. An **inflection point** is a point $(b, f(b))$ where the function changes concavity.

2. Consider the circle
$$x^2 + y^2 = 25.$$

What equation gives the **slope of the tangent line** to any point (x, y) on the circle?

This question is asking for $\frac{dy}{dx}$, so we need implicit differentiation:

$$\frac{d}{dx}\left(x^2 + y^2 = 25\right) \quad \Rightarrow \quad 2x + 2y\frac{dy}{dx} = 0$$
$$\Rightarrow \quad 2y\frac{dy}{dx} = -2x$$
$$\Rightarrow \quad \frac{dy}{dx} = -\frac{x}{y}$$