

## Math Camp - Homework 2

1. Given that:

$$\lim_{x \rightarrow a} f(x) = -3$$

$$\lim_{x \rightarrow a} g(x) = 0$$

$$\lim_{x \rightarrow a} h(x) = 8$$

find the following limits. If the limit doesn't exist, explain why.

$$(a) \lim_{x \rightarrow a} [f(x) + h(x)]$$

$$(c) \lim_{x \rightarrow a} \frac{f(x)}{h(x)}$$

$$(b) \lim_{x \rightarrow a} [f(x)]^2$$

$$(d) \lim_{x \rightarrow a} \frac{g(x)}{f(x)}$$

2. Find the following limits:

$$(a) \lim_{x \rightarrow -4} \frac{x^2 + 5x + 4}{x^2 + 3x - 4}$$

$$(c) \lim_{x \rightarrow -1} \frac{x-2}{x^2 + 4x - 3}$$

$$(b) \lim_{x \rightarrow 4^-} \sqrt{16 - x^2}$$

$$(d) \lim_{x \rightarrow -4} \frac{\frac{1}{4} + \frac{1}{x}}{4+x}$$

3. Differentiate the following using the rules we have discussed (chain rule, product rule, etc.)

$$(a) f(x) = 4x^3 + 2x^2 + 5x + 11$$

$$(f) f(x) = \log(x^2 e^x)$$

$$(b) y = \sqrt{30}$$

$$(c) y = 2^3 + \sin^3 x$$

$$(g) h(y) = \left(\frac{1}{y^2} - \frac{3}{y^4}\right)(y + 5y^3)$$

$$(d) h(t) = \log(9t + 1)$$

$$(e) g(x) = x^3 \cdot \cos 11x$$

$$(h) g(t) = \frac{3t - 1}{2t + 1}$$

4. Differentiate the following using both the product and quotient rules:

$$(a) f(x) = \frac{x^2 - 2x}{x^4 + 6}$$