

## Quiz #2

MATH 105 - Amber Buntin - Fall 2015



Directions: Please **show as many steps as possible** while computing the following limits. Use **concepts/techniques of CALCULUS** in order to evaluate the limits.

1. (3 points each) Evaluate the following limits using algebraic techniques.

a.  $\lim_{x \rightarrow -3} (-2x^2 - 3x + 13)$  ← Plug it in!

$$= -2(-3)^2 - 3(-3) + 13$$

$$= -2(9) + 9 + 13$$

$$= -18 + 9 + 13 = -9 + 13 = \boxed{4}$$

b.  $\lim_{x \rightarrow 49} \frac{\sqrt{x} - 7}{x - 49}$  ← Rationalize the numerator!

$$= \lim_{x \rightarrow 49} \frac{(\sqrt{x} - 7)}{x - 49} \left( \frac{\sqrt{x} + 7}{\sqrt{x} + 7} \right) \leftarrow \text{FOIL}$$

$$= \lim_{x \rightarrow 49} \frac{x + 7\sqrt{x} - 7\sqrt{x} + (-49)}{(x - 49)(\sqrt{x} + 7)}$$

$$= \lim_{x \rightarrow 49} \frac{x - 49}{(x - 49)(\sqrt{x} + 7)} = \lim_{x \rightarrow 49} \frac{1}{\sqrt{x} + 7} = \frac{1}{\sqrt{49} + 7}$$

$$= \frac{1}{7 + 7} = \frac{1}{14}$$

2. (4 points) Evaluate the following limit at infinity using algebraic techniques.

$$\lim_{x \rightarrow \infty} \frac{1 - 2x^2 + 4x}{3 + 8x^2}$$

~~limits~~ Limits at Infinity

→ Divide by highest power of  $x$  in denom!

$$= \lim_{x \rightarrow \infty} \frac{\frac{1}{x^2} - \frac{2x^2}{x^2} + \frac{4x}{x^2}}{\frac{3}{x^2} + \frac{8x^2}{x^2}}$$

$$= \lim_{x \rightarrow \infty} \frac{\frac{1}{x^2} - 2 + \frac{4}{x}}{\frac{3}{x^2} + 8}$$

$$= \frac{0 - 2 + 0}{0 + 8} = -\frac{2}{8} = \boxed{-\frac{1}{4}}$$

$$-4 + 3.74$$