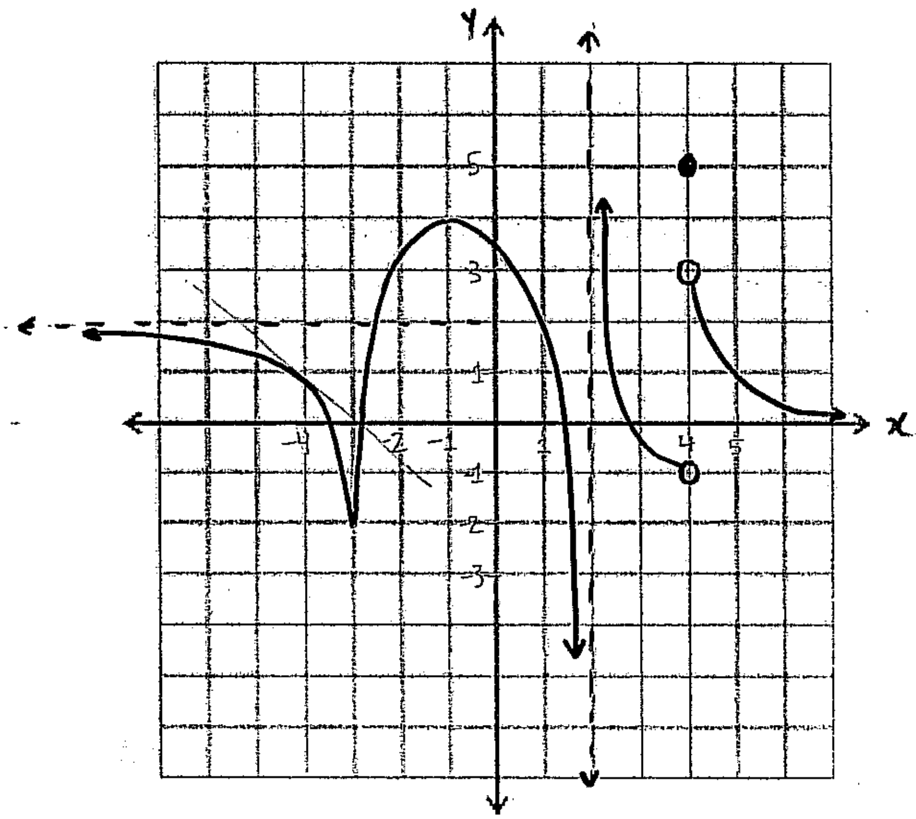
Quiz 2A, Business Calculus

Fall 2014 - Dr. Graham-Squire

Name: Key

1. (5 points) Use this graph of $f(x)$ to find the value of the expressions given below



(a) Estimate the value of the derivative at x=-4, that is, find $f'(-4)=$ about -1 ✓

(b) $\lim_{x\to 4^-} f(x) =$ -1 ✓

(c) $\lim_{x\to 2^+} f(x) =$ DNE (or ∞) ✓

(d) $\lim_{x\to\infty} f(x) =$ 0 ✓

(e) $\lim_{x\to(-1)} f(x) =$ 4 ✓

2. (2 points) Calculate the limit. Make sure to show your work and use correct notation to receive full points!

$$\lim_{x\to(-\infty)} \left(\frac{2x^3+3x-7}{5+2x^2-3x^3}\right) \cdot \frac{\left(\frac{1}{x^3}\right)}{\left(\frac{1}{x^3}\right)}$$ ✓

$$= \lim_{x\to(-\infty)} \frac{\frac{2x^3}{x^3} + \frac{3x}{x^3} - \frac{7}{x^3}}{\frac{5}{x^3} + \frac{2x^2}{x^3} - \frac{3x^3}{x^3}} \quad 0.5$$

$$= \lim_{x\to(-\infty)} \frac{2 + \overbrace{\frac{3}{x^2}}^{\to 0} - \overbrace{\frac{7}{x^3}}^{\to 0}}{\underbrace{\frac{5}{x^3}}_{\to 0} + \underbrace{\frac{2}{x}}_{\to 0} - 3} = \boxed{\frac{2}{-3}} \quad 0.5$$

3. (3 points) Find the value of k that will make the function continuous at $x = -1$. Make sure to use correct notation and explain/show your work. You must reference the definition of continuity in order to receive full points.

$$f(x) = \begin{cases} \frac{x^2-3x-4}{x+1} & \text{if } x < -1 \\ k & \text{if } x \geq -1 \end{cases}$$

def of continuity

Need to have $\lim_{x\to(-1)} f(x) = f(-1)$ 0.5

$$\lim_{x\to(-1)^-} f(x) = \lim_{x\to(-1)^-} \frac{x^2-3x-4}{x+1} \quad 0.5, \text{ and } f(-1) = k \quad 0.5$$

0.5

$$= \lim_{x\to(-1)^-} \frac{(x-4)\cancel{(x+1)}}{\cancel{x+1}}$$

$$= \lim_{x\to(-1)^-} x-4 = -5$$

To be continuous, need these things equal,

so $\boxed{k=-5}$ ✓

Quiz 2B, Business Calculus

Fall 2014 - Dr. Graham-Squire

3:06
3:10
4
$\Rightarrow \boxed{15 \text{ min}}$

Name: Key

1. (2 points) Calculate the limit. Make sure to show your work and use correct notation to receive full points!

$$\lim_{x\to\infty} \frac{5x^4+3x-7}{6+x^2-2x^4} \cdot \frac{\left(\frac{1}{x^4}\right)}{\left(\frac{1}{x^4}\right)}$$

$$= \lim_{x\to\infty} \frac{\frac{5\cancel{x^4}}{\cancel{x^4}} + \frac{3x}{x^4} - \frac{7}{x^4}}{\frac{6}{x^4} + \frac{x^2}{x^4} - \frac{2\cancel{x^4}}{\cancel{x^4}}}$$

$$= \lim_{x\to\infty} \frac{5 + \frac{3}{x^3} - \frac{7}{x^4}}{\frac{6}{x^4} + \frac{1}{x^2} - 2} = \boxed{\frac{5}{-2}}$$

$\frac{3}{x^3} \to 0$, $\frac{7}{x^4} \to 0$, $\frac{6}{x^4} \to 0$, $\frac{1}{x^2} \to 0$

2. (3 points) Find the value of k that will make the function continuous at $x = -1$. Make sure to use correct notation and explain/show your work. You must reference the definition of continuity in order to receive full points.

$$f(x) = \begin{cases} \dfrac{x^2+4x-5}{x+5} & \text{if } x < -5 \\ k & \text{if } x \geq -5 \end{cases}$$

Need $\lim_{x\to(-5)} f(x) = f(-5)$ $\quad$ $f(-5) = k$, so need

$\frac{0}{0} \leftarrow$ $\lim_{x\to(-5)} \frac{x^2+4x-5}{x+5} = k$

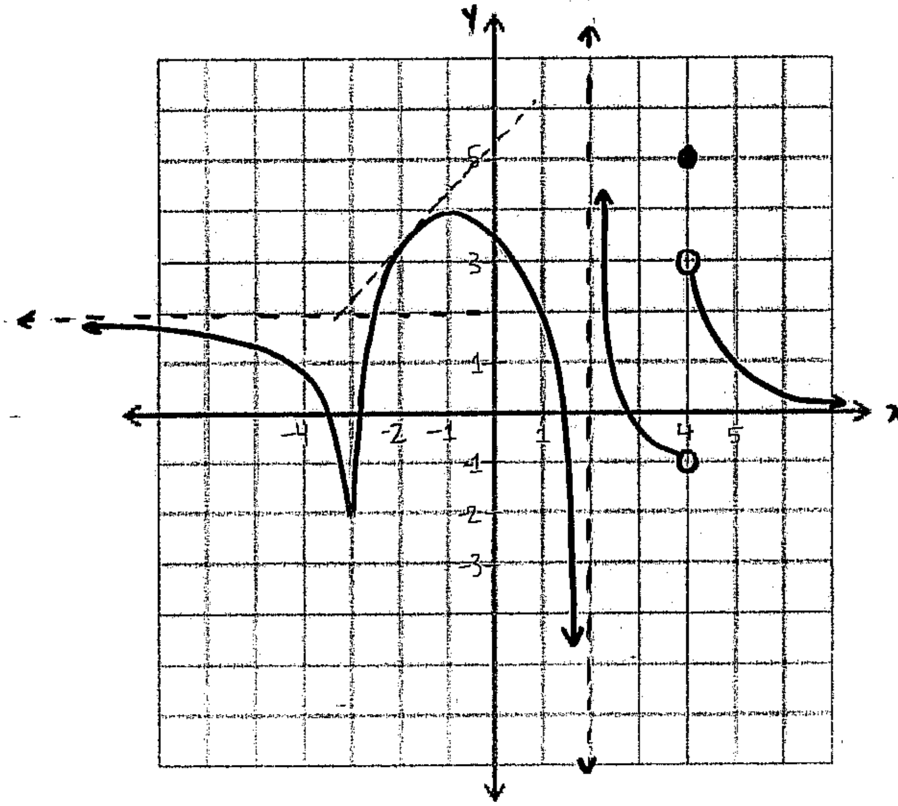
$\Rightarrow \lim_{x\to(-5)} \frac{\cancel{(x+5)}(x-1)}{\cancel{x+5}} = k$

$\Rightarrow \lim_{x\to(-5)} x-1 = k$

$\Rightarrow -5-1 = k$

$\boxed{k=-6}$

3. (5 points) Use this graph of $f(x)$ to find the value of the expressions given below



(a) $\lim_{x \to 4^+} f(x) =$ 3

(b) $\lim_{x \to 2^-} f(x) =$ DNE (or $-\infty$)

(c) $\lim_{x \to (-\infty)} f(x) =$ 2

(d) $\lim_{x \to (-3)} f(x) =$ -2

(e) Estimate the value of the derivative at x=-2, that is, find $f'(-2)$=

Approximately a slope of $\boxed{1}$ for tangent line at $x = -2$.