

Last Name: SOLUTIONS

First Name: _____

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Quiz 4

Question 1. (2 marks) Where is the following function continuous?

$$f(x) = \frac{x-1}{x^2+x-12} = \frac{x-1}{(x-3)(x+4)} \quad \therefore f \text{ IS CONTINUOUS WHEN } x \neq -4, 3$$

$\therefore f$ IS CONTINUOUS ON $(-\infty, -4) \cup (-4, 3) \cup (3, \infty)$

Question 2. (8 marks) Find the slope of the tangent line to the graph of

$$f(x) = -\frac{1}{x}$$

at the point $(3, -1/3)$. Find the equation of this tangent line. (Clearly show your work and use correct notation).

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h} = \lim_{h \rightarrow 0} \frac{-\frac{1}{x+h} - \left(-\frac{1}{x}\right)}{h}$$

$$= \lim_{h \rightarrow 0} \frac{-\frac{1}{x+h} + \frac{1}{x}}{h} = \lim_{h \rightarrow 0} \frac{-\frac{x}{x+h} + \frac{x+h}{x}}{h}$$

$$= \lim_{h \rightarrow 0} \frac{-\frac{x + (x+h)}{(x+h)(x)}}{h} = \lim_{h \rightarrow 0} \frac{-k}{(x+h)(x)} \cdot \frac{1}{h}$$

$$= \lim_{h \rightarrow 0} \frac{1}{(x+h)(x)} = \frac{1}{(x+0)(x)} = \frac{1}{x^2} \quad \therefore f'(3) = \frac{1}{3^2} = \frac{1}{9}$$

TANGENT LINE!

$$y = mx + b$$

$$-\frac{1}{3} = \frac{1}{9}(3) + b$$

$$-\frac{1}{3} - \frac{1}{3} = b$$

$$b = -\frac{2}{3}$$

$$y = \frac{1}{9}x - \frac{2}{3}$$