

Math 1203 Quiz 6

February 20, 2019

Name: ANSWERS

Instructions: No calculators. Answer all problems in the space provided! Do your rough work on scrap paper.

1. Compute the following limits, or write "DNE" if they do not exist. ∞ and $-\infty$ are valid answers:

(a) $\lim_{x \rightarrow -1} \frac{x+1}{x^2+1} = \underline{0}$ (b) $\lim_{x \rightarrow -\infty} \frac{2-3x+\pi x^3}{\sqrt{2+3x^4}-7x} = \underline{0}$

(c) $\lim_{x \rightarrow -\infty} \frac{4x^2+9x^3}{5-3x^3} = \underline{-3}$ (d) $\lim_{x \rightarrow -\infty} \frac{2+3x-7x^7}{4-3x^2+x^4} = \underline{\infty}$

(e) $\lim_{x \rightarrow -1^+} \frac{x^2-4x}{x^2-3x-4} = \underline{-\infty}$ (f) $\lim_{h \rightarrow 0} \frac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h} = \underline{-\frac{2}{x^3}}$

(g) $\lim_{t \rightarrow \infty} \frac{(2t^2+1)^2}{(t+1)^2(3t^2+t)} = \underline{4/3}$ (h) $\lim_{x \rightarrow 3^-} \frac{9-x^2}{x-3} = \underline{-6}$

2. Suppose $f(x) = 2 - x - x^2$. Find $\lim_{h \rightarrow 0} \frac{f(2+h)-f(2)}{h} = \underline{-5}$

Bonus:

1. With an equation, define what it means for $f(x)$ to be continuous at a point $(a, f(a))$.

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

2. Define $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h)-f(x)}{h}$ (provided it exists)

3. In terms of derivatives, describe the following:

(a) $f(x)$ is increasing: $f'(x) > 0$

(b) $f(x)$ is concave down: $f''(x) < 0$