

Math 201 Quiz 4B

September 16, 2019

12

Name: ANSWERS

Instructions: No calculators. Use your own scrap. Write your fully simplified answers in the space provided.

1. Suppose $5x \leq p(x) \leq x^4 - x^2 + 5$ for all x , what is $\lim_{x \rightarrow 1} p(x) =$ 5

2. Compute the following limits, or write "DNE" if they do not exist:

(a) $\lim_{x \rightarrow 0} \frac{\cos^3 x}{3+5x^4} =$ $\frac{1}{3}$ (b) $\lim_{x \rightarrow 9} \frac{3-\sqrt{x}}{9x-x^2} =$ $\frac{1}{54}$

(c) $\lim_{h \rightarrow 0} \frac{\frac{1}{(x+h)^2} - \frac{1}{x^2}}{h} =$ $-\frac{2}{x^3}$ (d) $\lim_{x \rightarrow 2^+} \frac{3x-6}{|x-2|} =$ 3

(e) $\lim_{x \rightarrow 0} \left(\frac{1}{x} - \frac{1}{|x|} \right) =$ DNE (f) $\lim_{x \rightarrow 0} \frac{\sin x^3}{x} =$ 0

(g) $\lim_{t \rightarrow 0} \frac{\tan 3t}{4t + \sin 5t} =$ $\frac{1}{3}$ (h) $\lim_{x \rightarrow 0} \frac{5 - 5 \cos x}{\sin x} =$ 0

(i) $\lim_{x \rightarrow 0} \frac{\sin 5x}{3x^2 - 4x} =$ $-\frac{5}{4}$ (j) $\lim_{x \rightarrow 0} \frac{\sin 4x \sin 5x}{3x^2} =$ $\frac{20}{3}$

3. Let $f(x) = 2x^2 - 1$, compute $\lim_{h \rightarrow 0} \frac{f(3+h) - f(3)}{h} =$ 12

Bonus:

1. Let $f(x)$ be a function. Write down an equation that defines when $f(x)$ is continuous at a point $x = a$.

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

2. Find a and b so that $f(x) = \begin{cases} \frac{4 \sin x}{x}, & x < 0 \\ a, & x = 0 \\ b \cos x - 1, & x > 0 \end{cases}$ is continuous for all x . $a =$ 4, $b =$ 5

3. Explain what the answer to problem 3 means the slope of $f(x)$ at $x=3$ is 12.
or the derivative of $f(x)$ at $x=3$ is 12.