

Math 201 Quiz 4A

September 16, 2019

Name: _____

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

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

(a) $\lim_{x \rightarrow 0} \frac{\sin^2 x - 1}{4 - 3x^4} =$ _____ (b) $\lim_{x \rightarrow 25} \frac{5 - \sqrt{x}}{25x - x^2} =$ _____

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

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

(g) $\lim_{t \rightarrow 0} \frac{\tan 3t}{3t + \sin 2t} =$ _____ (h) $\lim_{x \rightarrow 0^+} \frac{3 \cos x - 3}{\sin x} =$ _____

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

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

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

Bonus:

1. Explain what the answer to problem 3 means _____

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

3. 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 . $a =$ _____, $b =$ _____