

# Math 201 Quiz 4B

September 16, 2019

Name: \_\_\_\_\_

**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  $\lim_{x \rightarrow 1} p(x) =$  \_\_\_\_\_

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

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

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

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

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

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

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

## Bonus:

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

\_\_\_\_\_

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  $x$ .  $a =$  \_\_\_\_\_,  $b =$  \_\_\_\_\_

3. Explain what the answer to problem 3 means \_\_\_\_\_