

# Math 2215 - Calculus 1

Exam #1 - 2017.09.07

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

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**Instructions:** Please work out each problem in full detail. No points are given for a correct answer.

For problems 1–11, compute each limit. If the limit does not exist, differentiate between  $+\infty$ ,  $-\infty$ , or does not exist.

1.  $\lim_{x \rightarrow \infty} \sin\left(\frac{x}{1+x^2}\right)$

2.  $\lim_{x \rightarrow 0} \sin\left(\frac{x}{1+x^2}\right)$

3.  $\lim_{x \rightarrow \infty} \frac{\sqrt{x^2 + 2x - 1}}{3x - 7}$

4.  $\lim_{x \rightarrow -\infty} \frac{\sqrt{x^2 + 2x - 1}}{3x - 7}$

5.  $\lim_{x \rightarrow 0} \frac{x^2}{\cos(x)}$

6.  $\lim_{x \rightarrow 0} \frac{\cos(x)}{x^2}$

7.  $\lim_{x \rightarrow 0} \frac{\sin(3x)}{4x}$

8.  $\lim_{x \rightarrow 2^+} \frac{(2x-3)(x-3)}{(x-2)(x+3)}$

9.  $\lim_{x \rightarrow 2^-} \frac{(2x-3)(x-3)}{(x-2)(x+3)}$

10.  $\lim_{x \rightarrow 3^-} \frac{(2x-3)(x-3)}{(x-2)(x+3)}$

11.  $\lim_{x \rightarrow \infty} \frac{(2x-3)(x-3)}{(x-2)(x+3)}$

12. Find values of  $a$  and  $b$  so that the following piecewise function is continuous everywhere.

$$f(x) = \begin{cases} \frac{2}{\pi}x - a, & x \leq -\pi \\ b \cos(x) + 4, & -\pi < x < \pi \\ 3 \sin\left(\frac{x}{2}\right) - 1, & x \geq \pi \end{cases}$$

13.  $\tan(\pi/4) =$

14.  $\tan^2(x) + 1 =$