Math 1A (7:30am – 8:20am)
Midterm 1
Thu Oct 9, 2008

What day of the month is your birthday ? ___ ___
What are the last 2 digits of your address ? ___ ___
What are the last 2 digits of your zip code ? ___ ___
What are the last 2 digits of your social security number ? ___ ___
[IF YOU DO NOT HAVE A SOCIAL SECURITY NUMBER, USE YOUR STUDENT ID NUMBER]

CALCULATOR ALLOWED ON THIS SECTION

Find the one statement below which is false. Give a counterexample showing why it is false. **SCORE: ___ / 8 POINTS**

Statement 1: If $\lim_{x\to a} f(x) = +\infty$ and $\lim_{x\to a} g(x) = +\infty$, then $\lim_{x\to a} f(x)g(x) = +\infty$.

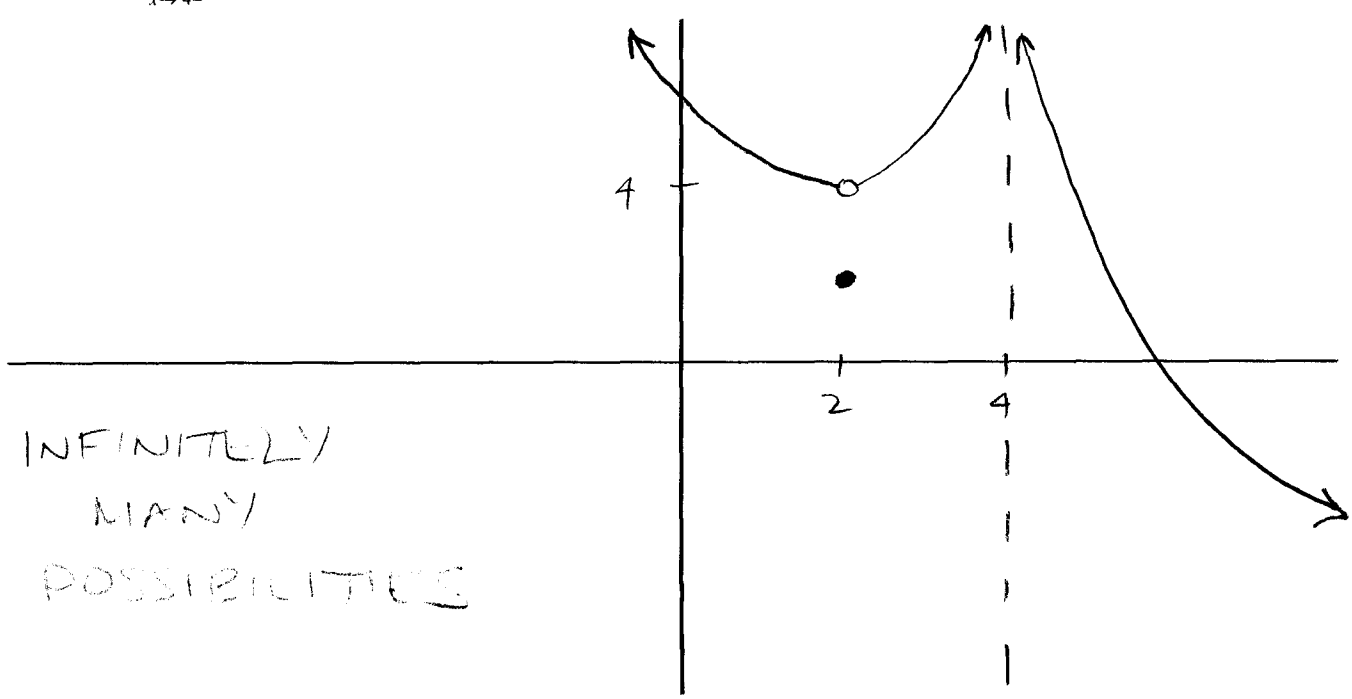
Statement 2: If $\lim_{x\to a} f(x) = +\infty$ and $\lim_{x\to a} g(x) = +\infty$, then $\lim_{x\to a}[f(x) - g(x)] = 0$.

Statement 3: If $\lim_{x\to a} f(x) = +\infty$ and $\lim_{x\to a} g(x) = +\infty$, then $\lim_{x\to a}[f(x) + g(x)] = +\infty$.

SEE OTHER KEY

Sketch a graph of a function f with **all** the following properties. **SCORE: ___ / 10 POINTS**

The domain of f is all real numbers except $x = 4$,
f has a removable discontinuity at $x = 2$ and a non-removable discontinuity at $x = 4$,
$\lim_{x\to 2+} f(x) = 4$, and $\lim_{x\to 4-} f(x) = +\infty$.



INFINITELY MANY POSSIBILITIES

A function f is continuous from the left at $x = a$ if $\lim_{x \to a^-} f(x) = f(a)$. **SCORE: ___ / 8 POINTS**

If $f(x) = \begin{cases} cx^2 + 1 & \text{if } x < 2 \\ -1 & \text{if } x = 2 \\ cx + 4 & \text{if } x > 2 \end{cases}$, find all values of c so that f is continuous from the left at $x = 2$ (if possible).

Show all algebraic work.

$$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} (cx^2 + 1) = 4c + 1$$

$$f(2) = -1$$

$$4c + 1 = -1$$

$$c = -\frac{1}{2}$$

Let $f(x) = -1 + x \cos x$. **SCORE: ___ / 16 POINTS**

[a] Prove that $f(x)$ has a zero in the interval $[-8, 8]$. **You must justify your argument properly as shown in class.**

SEE OTHER KEY

[b] Use the method of bisections on the interval $[-8, 8]$ to find an interval of width 1 that contains a zero.
You must show all x-values you used in the method of bisections.

SEE OTHER KEY