Math 1A (9:30am – 10:20am)
Midterm 1
Tue Jan 27, 2008

What month is your birthday ? ___ ___
What are the first 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]

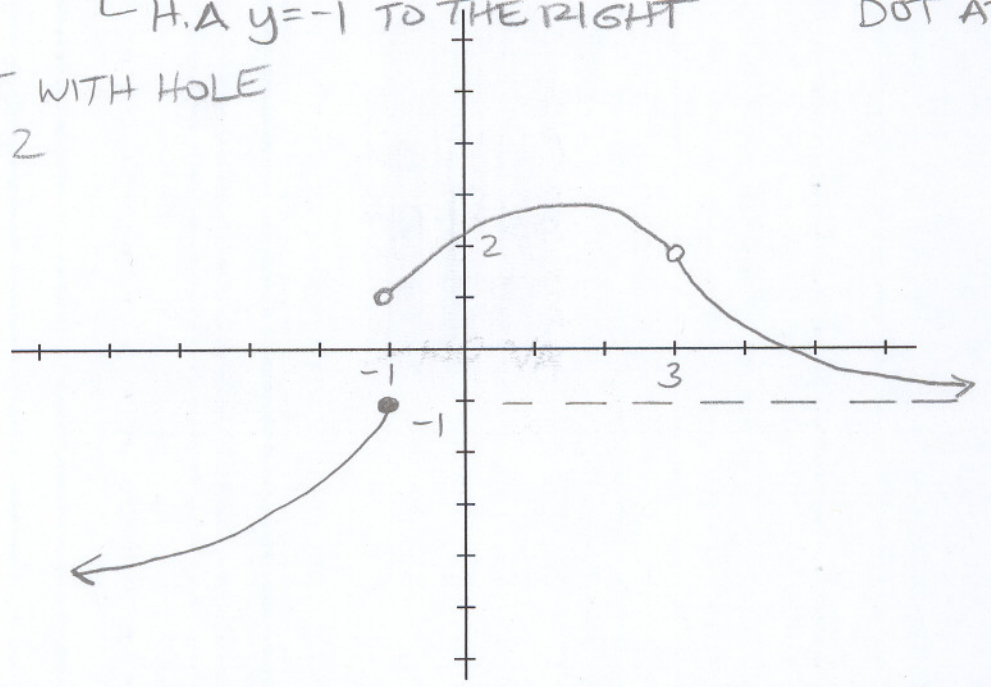
CALCULATOR ALLOWED ON THIS SECTION

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

The domain of f is all real numbers except $x = 3$, ← NO VALUE AT $x=3$

f has a removable discontinuity at $x = 3$ and a non-removable discontinuity at $x = -1$, ← JUMP OR V.A. AT $x=-1$;

$\lim_{x \to 3^+} f(x) = 2$, and $\lim_{x \to \infty} f(x) = -1$. ↑ 2 SIDED LIMIT WITH HOLE AT $x=3, y=2$ ↑ H.A $y=-1$ TO THE RIGHT DOT AT $x=-1$



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

If $f(x) = \begin{cases} cx+3 & \text{if } x \le 2 \\ 5-x & \text{if } 2 < x < 3 \\ cx^2-4 & \text{if } x \ge 3 \end{cases}$, find all values of c so that f is continuous from the left at $x = 2$ (if possible).

Show all relevant work.

$\lim_{x \to 2^-} f(x) = \lim_{x \to 2^-} (cx+3) = 2c+3$ ↖ EQUAL FOR ALL c

$f(2) = 2c+3$ ↗

SO f IS CONT. FROM THE LEFT AT $x=2$ FOR ALL c

Let $f(x) = 1 + x\cos 3x$.

SCORE: ___ / 12 POINTS

[i] Prove that $f(x)$ has a zero in the interval $[0, 16]$. **You must justify your argument properly as shown in class.**

SEE OTHER KEY

[ii] **MULTIPLE CHOICE:** Use the method of bisections on the interval $[0, 16]$ to find an interval of width 1 that contains a zero.

[a] $[7, 8]$ [b] $[9, 10]$ [c] $[11, 12]$ [d] $[13, 14]$

Is the statement below true or false ? If it is true, give a brief explanation why it is true.
If it is false, give a counterexample showing why it is false.

SCORE: ___ / 8 POINTS

Statement: If $\lim_{x \to a} f(x)$ does not exist, then $\lim_{x \to a} \frac{1}{f(x)}$ does not exist

SEE OTHER KEY