Name: _____ Sept. 14, 2012

I'm in the Thurs11 Thurs12 Thurs1 or Fri10 recitation (Circle one) MATH 200 – TEST 1 ♢

1. (10 pts.) This problem concerns the functions $f(x) = \dfrac{\sqrt{x-1}}{5+\sin(x)}$ and $g(x) = \sqrt{x} - 1$.

   (a) State the domain of $f(x)$.

   (b) $f \circ g(x) =$

2. (10 pts.) Consider the equation $4\cos^2(x) - 3 = 0$. Find all solutions x that lie in the interval $[0, 2\pi)$.

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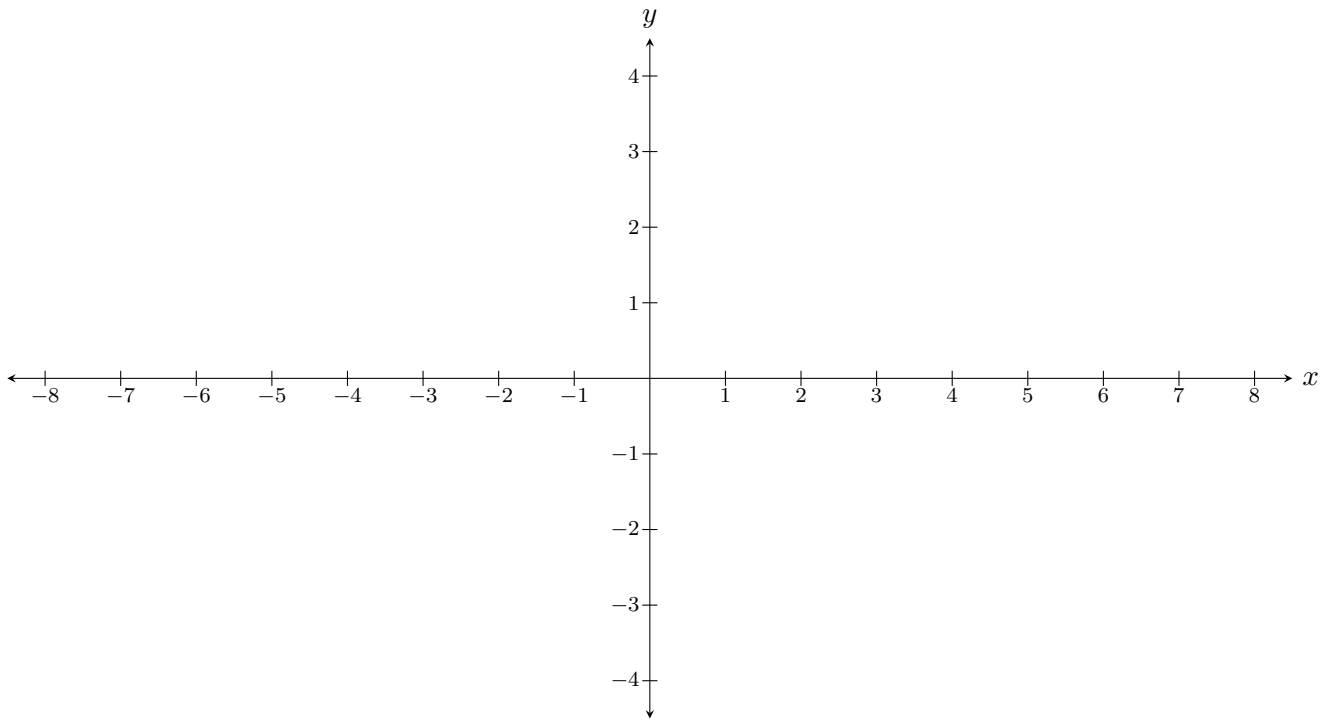
3. (10 pts.) Sketch the graph of any function $y = f(x)$ that meets the following four criteria: The line $x = 4$ is a vertical asymptote, the line $y = -1$ is a horizontal asymptote, $f(-4) = 2$, and $\lim_{x \to -3} f(x) = 0$.



4. (20 pts.) Answer the following questions about the function $y = f(x)$ graphed below.

(a) $f(1) =$

(b) $f \circ f(2) =$

(c) $\lim_{x \to 0} f(x) =$

(d) $\lim_{x \to 1} f(x) =$

(e) $\lim_{x \to 1^+} f(x) =$

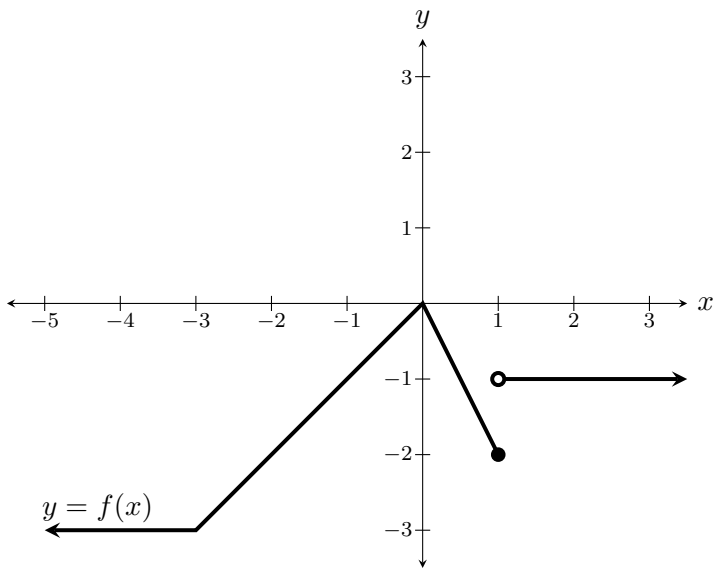
(f) $\lim_{x \to 1^-} f(x) =$

(g) $\lim_{x \to \infty} f(x) =$

(h) $\lim_{x \to -\infty} f(x) =$

(i) State an interval on which $f(x)$ is continuous.

(j) State an x-value at which $f(x)$ is discontinuous.



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5. (28 pts.) Evaluate the following limits.
If you want credit, show your steps, explain your reasoning, and carry limits as appropriate.

(a) $\lim_{x \to -1} \dfrac{x^2 - 3x - 4}{x^2 + 5x + 4} =$

(b) $\lim_{h \to 0} \dfrac{\sqrt{5 - h} - \sqrt{5}}{h} =$

(c) $\lim_{x \to 3^-} \dfrac{(-x + 3)(x + 5)}{|-x + 3|} =$

(d) $\lim_{\theta \to 0} \dfrac{\frac{1}{\theta} \sin(5\theta)}{\cos(\theta)} =$

6. (12 pts.) Find all the horizontal asymptotes and vertical asymptotes of $f(x) = \dfrac{x^2 + 5x + 4}{x^2 + 6x + 8}$.

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7. (10 pts.) Find the value a such that the following $f(x)$ is continuous at every number x.

$$f(x) = \begin{cases} -x^2 + 2 & \text{if } x < 3 \\ ax & \text{if } x \geq 3 \end{cases}$$