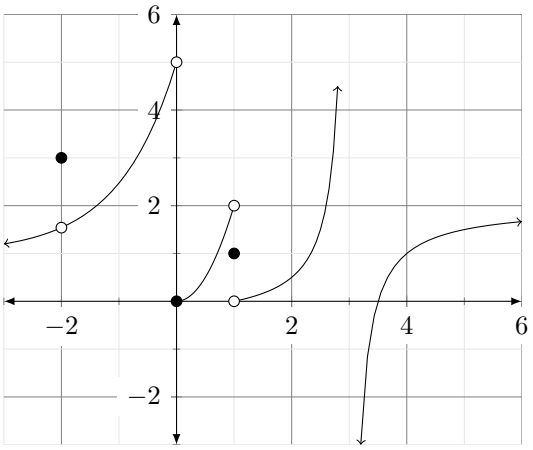
RECITATION 4
REVIEW OF SECTIONS 2.2-2.6

1. Use the graph of the function $f(x)$ to answer the questions below.



(a) $\lim_{x\to -2} f(x) =$ _____ $\lim_{x\to 0} f(x) =$ _____

(b) $\lim_{x\to 1} f(x) =$ _____ $\lim_{x\to 2} f(x) =$ _____

(c) $\lim_{x\to 3} f(x) =$ _____

(d) $\lim_{x\to 0^-} f(x) =$ _____ $\lim_{x\to 0^+} f(x) =$ _____

(e) $\lim_{x\to 3^-} f(x) =$ _____ $\lim_{x\to 3^+} f(x) =$ _____

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

(g) $f(-2) =$ _____ $f(0) =$ _____

(h) $f(1) =$ _____ $f(3) =$ _____

List all values for which $f(x)$ *fails* to be continuous.

List all asymptotes of $f(x)$ and identify which are vertical and which are horizontal.

2. Evaluate the limits below:

(a) $\lim_{x\to 3^-} \dfrac{\sqrt{x}}{(x-3)^5}$

(b) $\lim_{x\to \frac{\pi}{2}+} x \tan x$

3. Evaluate the limits if they exist. If they do not exist, explain why.

(a) $\lim_{x \to -2} \dfrac{x+2}{x^3+8}$

(b) $\lim_{t \to 0} \dfrac{\sqrt{1+t} - \sqrt{1-t}}{t}$

(c) $\lim_{x \to -6} \dfrac{3x+18}{|x+6|}$

4. Find the value of c such that $B(t)$ is a continuous function where $B(t) = \begin{cases} 4 - \frac{1}{2}t & t < 2 \\ \sqrt{t+c} & t \geq 2. \end{cases}$

5. Given $f(x) = \begin{cases} 2^x & x \leq 1 \\ 3 - x & 1 < x \leq 4 \\ \sqrt{x} & 4 < x, \end{cases}$

   (a) find all the numbers at which f is discontinuous.

   (b) Of the numbers from part (a), at which is $f(x)$ continuous from the right? The left?

6. State the Intermediate Value Theorem and draw the associated picture.

7. Use the Intermediate Value Theorem to show that the equation $\sin x = x^2 - x$ must have a solution in the interval $(1, 2)$.

8. For each of the following, find the limit or show that it does not exist.

(a) $\lim_{x\to-\infty} \dfrac{4x^3-5x^2-3}{\sqrt{3}x^3+x+\pi}$

(b) $\lim_{x\to\infty} \dfrac{\sqrt{2+5x^6}}{4+x^3}$

(c) $\lim_{x\to-\infty} (\sqrt{9x^2+4x}-3x)$

(d) $\lim_{x\to0^+} \tan^{-1}(\ln x)$

9. Find the horizontal and vertical asymptotes, if any.

(a) $f(x) = \frac{4+8x}{3x-1}$

(b) $g(t) = \frac{t^3-t}{t^2-6t+5}$