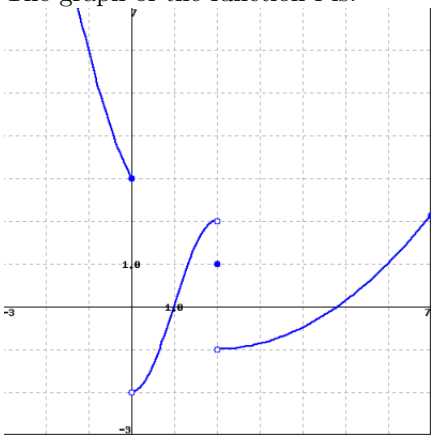
APPM 1350 Recitation, Fall 2021, Week 3, Sep 07

Limits with Graphs

The graph of the function f is:



Evaluate the following:

- $\lim_{x\to 0^-} f(x)$
- $\lim_{x\to 2} f(x)$
- $f(0)$
- $\lim_{x\to 0^+} f(x)$
- $\lim_{x\to 2^-} f(x)$
- $\lim_{x\to 2^+} f(x)$
- $f(2)$
- $\lim_{x\to 1} f(x)$

Limits with Piecewise Functions

$$f(x) = \begin{cases} -2x - 5 & \text{if } x < -2 \\ x^2 - 3 & \text{if } -2 \le x < 1 \\ 2 & \text{if } x \ge 1 \end{cases}$$

Evaluate the following. At what values is the function discontinuous?
Use the definition of continuity to justify your answer.

- $\lim_{x\to -2^-} f(x)$
- $\lim_{x\to -2^+} f(x)$
- $f(-2)$
- $f(1)$
- $\lim_{x\to 1^+} f(x)$
- $\lim_{x\to 1^-} f(x)$

Limits with Functions

1. Evaluate $\lim_{t\to 0} \dfrac{\sqrt{t^2+16}-4}{t^2}$
2. Evaluate $\lim_{x\to c} \dfrac{(x-2)|x-1|}{x^2-3x+2}$ for $c = 1^+, 1^-, 2^+, 2^-$
3. Evaluate $\lim_{x\to 0} \dfrac{\sin 3x}{5x}$
4. Evaluate $\lim_{x\to 0} x^2 \cos\left(\dfrac{1}{x^2}\right)$
5. Evaluate $\lim_{x\to 0} \dfrac{\sin 4x}{5x^3-2x}$. At what values is the function discontinuous?
6. Evaluate $\lim_{h\to 0} \dfrac{(6+h)^2-36}{h}$

Intermediate Value Theorem

Use the Intermediate Value Theorem to show that the following equations have at least one solution:

1. $x^5 - 6x^3 + 3x + 1 = 0$
2. $2\sin(x) = 3 - 2x$