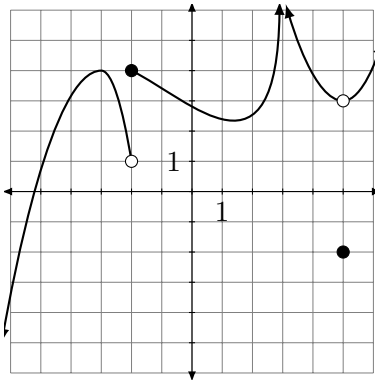


1. (6 pts) Below is the graph of a function $f(x)$. For each of the six quantities listed to the right, either give its value or specifically state that it does not exist.



$$\lim_{x \rightarrow -3} f(x)$$

$$f(-2)$$

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

$$\lim_{x \rightarrow 3} f(x)$$

$$\lim_{x \rightarrow -2^-} f(x)$$

$$\lim_{x \rightarrow 5} f(x)$$

2. (6 pts) For each of the following limits, either determine its value or demonstrate that the limit does not exist.

(a) $\lim_{x \rightarrow 1^+} \frac{2x-2}{x^3+3x-7}$

(b) $\lim_{t \rightarrow 2} \sqrt{4-2t}$

(c) $\lim_{s \rightarrow -3} \frac{s^2+s-6}{s^2+3s}$

3. (4 pts) Use epsilon-delta methods to prove that $\lim_{x \rightarrow 2} -5x + 2 = -8$.

4. (4 pts) Find a and b to make the function $f(x) = \begin{cases} 2^x & \text{if } x \leq 3 \\ \frac{a}{x} & \text{if } 3 < x < 8 \\ 2x + b & \text{if } x \geq 8 \end{cases}$ continuous everywhere.

5. (2 pt bonus) When x is a nonzero rational number which is written in lowest terms as $\frac{p}{q}$, let $f(x) = \frac{1}{p}$; when x is irrational, let $f(x) = 0$. Find, with justification, the value of $\lim_{x \rightarrow 0} f(x)$.