Math 151 - Week-In-Review 3

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Problem Statements

1. Find the limit.

    (a) $\lim_{x \to 5} \frac{-1}{(x-5)^6}$

    (b) $\lim_{x \to 5} \frac{-1}{(x-5)^5}$

(c) $\lim_{x \to 5} \frac{x-5}{x^2+2x+1}$

(d) $\lim_{t \to 0} \frac{t^2-5t}{t^2+3t}$

(e) $\lim_{t \to 1} \frac{\sqrt{2-t}-1}{t-1}$

(f) $\lim_{h \to 0} \frac{(5-h)^{-1}-5^{-1}}{h}$

2. Find the following limits:

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

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

(c) $\lim_{x \to 0} \frac{\sqrt{5-t}-\sqrt{5}}{t}$

(d) $\lim\limits_{x \to 3^+} \dfrac{|3-x|}{x-3}$

(e) $\lim\limits_{x \to 3^-} \dfrac{|3-x|}{x-3}$

(f) $\lim\limits_{x \to 3} \dfrac{|3-x|}{x-3}$

3. Let $f(x) = \begin{cases} x+3 & \text{if } x < 0 \\ -x^2 & \text{if } 0 < x < 4 \\ 4x & \text{if } x > 4 \end{cases}$ and evaluate each of the following limits if they exist.

(a) $\lim_{x \to 0^-} f(x)$

(b) $\lim_{x \to 0^+} f(x)$

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

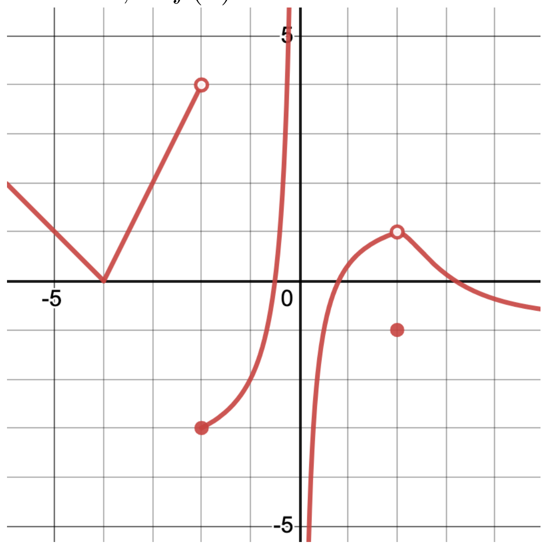
(d) $\lim_{x \to 2} f(x)$

(e) $\lim_{x \to 4^-} f(x)$

(f) $\lim_{x \to 4^+} f(x)$

(g) $\lim_{x \to 4} f(x)$

4. Refer to the graph of $f(x)$ below. Find all values of x where $f(x)$ is discontinuous. For these values of x, is $f(x)$ continuous from the right, left or neither? Support your answer.



5. Determine whether the following functions are continuous at the indicated value of x. Support your answer.

(a) $f(x) = \begin{cases} \arctan(x) + 1 & \text{if } x < 0 \\ 0 & \text{if } x = 0 \\ 1 - x^3 & \text{if } x > 0 \end{cases}$ at $x = 0$

(b) $f(x) = \dfrac{1}{x-1}$ at $x = 1$

(c) $f(x) = \dfrac{x+4}{x^2+5x+4}$ at $x = -1$ and $x = -4$

6. Find the values of a and b that make f continuous everywhere.

$$f(x) = \begin{cases} \dfrac{x^2-1}{x+1} & \text{if } x < -1 \\ ax^2 + bx - 5 & \text{if } -1 \le x \le 2 \\ 3x - a + 2b & \text{if } x > 2 \end{cases}$$