MAC 2311: Worksheet 0901

Panther ID: _____ **NAME:** _____

1. Evaluate the following limits:

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

(b) $\lim_{x\to 3^-} \dfrac{2}{x-3}$

(c) $\lim_{x\to 3} \dfrac{2}{x-3}$

2. Find the limit as $x \to 2$ (if it exists) and then sketch the graph of each of the following:

(a) $f(x) = x + 2$

(b) $g(x) = \dfrac{x^2-4}{x-2}$

3. If $\lim_{x\to 1} f(x) = 3$, $\lim_{x\to 1} g(x) = -2$, and $\lim_{x\to 1} h(x) = 7$, find:

(a) $\lim_{x\to 1} (f(x) + g(x))$

(b) $\lim_{x\to 1} (g(x) - h(x))$

(c) $\lim_{x\to 1} (f(x)h(x))$

(d) $\lim_{x\to 1} (3f(x))^2$

(e) $\lim_{x\to 1} \left(\dfrac{g(x)}{h(x)}\right)$

4. Find the following limits, provided they exist:

(a) $\lim_{x\to 0} \dfrac{x^2-3x}{x^2-4x+3}$

(b) $\lim_{x\to 3} \dfrac{x^2-3x}{x^2-4x+3}$

(c) $\lim_{x\to 2} \dfrac{x^2+x-6}{2-x}$

(d) $\lim_{x\to 2} \dfrac{x^2+x-6}{|2-x|}$

5. Find the following limits, provided they exist:

(a) $\lim_{x\to 4} \dfrac{x-4}{\sqrt{x}-2}$

(b) $\lim_{x\to -1} \dfrac{\sqrt{x^2+8}-3}{x+1}$

(c) $\lim_{x\to 1} \dfrac{x^3-1}{x^3+6x^2-8x+1}$

(d) $\lim_{x\to 2} \dfrac{8-x^3}{x^3-5x+2}$

6. For each of the following functions compute $\lim_{x\to+\infty} f(x)$ and $\lim_{x\to-\infty} f(x)$:

(a) $f(x) = 3x^3 - x^2 + 2x - 7$

(b) $f(x) = \dfrac{2x+1}{3x^4-2}$

(c) $f(x) = \dfrac{40x^5 + x^2}{16x^4 - 2}$

(d) $f(x) = \dfrac{3x^7 - 4x^4 + 1}{2x^7 + 2x}$

(e) $f(x) = \dfrac{2x}{x^2+4}$

Which of the functions above have horizontal asymptotes and what are the asymptotes?

7. Find the following limits, provided they exist:

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

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

Does the function $f(x) = \dfrac{2x}{\sqrt{x^2+4}}$ have horizontal asymptotes? If yes, describe them?

8. Consider the function $f(x) = \dfrac{3-x}{x^2-9}$.

(a) Does this function have horizontal asymptotes? Justify your answer with limits.

(b) Does this function have vertical asymptotes? Justify your answer with limits.

(c) Graph this function.