Name: _____   Problem Set #1

1. Draw a graph of a function that has the
   following characteristics.

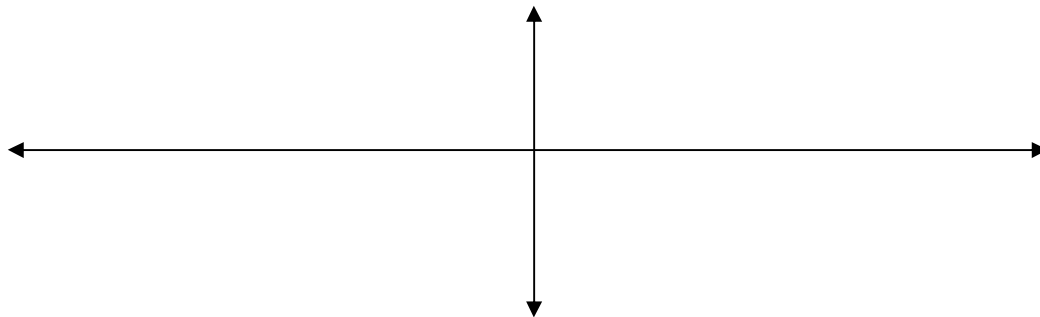$$\lim_{x \to \infty} f(x) = 2$$ $$\lim_{x \to 1^-} f(x) = -\infty$$ $$\lim_{x \to 1^+} f(x) = -\infty$$

$$\lim_{x \to -\infty} f(x) = -1$$ $$\lim_{x \to 4^+} f(x) = 3$$ $$\lim_{x \to 4^-} f(x) = -2$$

Find each of the following limits analytically. Show work when appropriate. If the limit does not exist,
write "DNE"

2. $$\lim_{x \to 1^-} \frac{|x-1|}{x-1} =$$

3. $$\lim_{x \to 9} \frac{x^2 - 81}{x - 9} =$$

4. $$\lim_{x \to \infty} \frac{18x^3 + 5}{6x^3 - 2} =$$

5. $$\lim_{x \to 3} f(x) \text{ given } f(x) = \begin{cases} \dfrac{x^2 - 9}{x - 3} & , x \neq 3 \\ 5 & , x = 3 \end{cases}$$

6. $$\lim_{x \to 2^+} f(x) \text{ given } f(x) = \begin{cases} x^2 + 3 & , x \leq 2 \\ x - 1 & , x > 2 \end{cases}$$

7. $$\lim_{x \to 2} f(x) \text{ given } f(x) = \begin{cases} x + 4 & , x \leq 2 \\ x - 3 & , x > 2 \end{cases}$$

8. $$\lim_{x \to 0} \frac{\sqrt{x + 16} - 4}{x}$$

9. $$\lim_{x \to 0^+} \frac{|2x|}{x}$$

10. $$\lim_{x \to 5^+} \frac{x}{x - 5}$$

11. $$\lim_{x \to 4^+} \frac{4 - x}{\sqrt{x} - 2}$$

12. $$\lim_{x \to -\infty} \frac{|x|}{x}$$

13. $$\lim_{x \to +\infty} \frac{\sqrt[3]{x^6 - 2x}}{x^2 + 3}$$