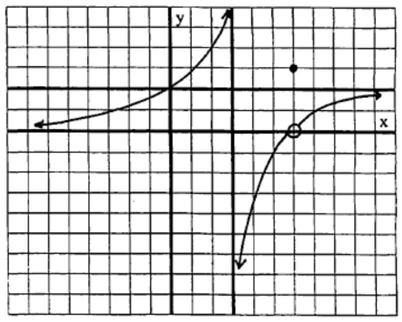
Name: ______________________ **Precalculus Unit 12, Lesson 2**

Aim: How do we use algebraic techniques to find limits?

I. Do Now:

1. Given the graph of $f(x)$ below, find:



(a) $\lim_{x \to 3^-} f(x)$

(b) $\lim_{x \to 3^+} f(x)$

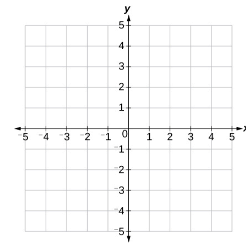
(c) $\lim_{x \to 3} f(x)$

(d) $\lim_{x \to 6} f(x)$

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

(f) $f(6)$

2. Graph $f(x) = 3$ below.



Find:

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

(b) $\lim_{x \to \infty} f(x)$

II. Development:

Methods of Evaluating Limits:

1. Direct Substitution (If the result is $\frac{0}{0}$ or $\frac{\infty}{\infty}$, use another method.)
2. Factor and cancel.
3. Rationalize the numerator or denominator.
4. Simplify the complex fraction.

III. Applications: Find the limits, if they exist. If they do not exist, write one of the following DNE, DNE $(+\infty)$, or DNE $(-\infty)$.

3. $\lim_{x \to 3} (x)$

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

5. $\lim_{x \to 4} 3$

6. $f(x) = \begin{cases} \sqrt[3]{x}, & x \le 1 \\ x + 5, & x > 1 \end{cases}$ (a) $\lim_{x \to 1^+} f(x)$ (b) $\lim_{x \to 1^-} f(x)$ (c) $\lim_{x \to 1} f(x)$

7. $\lim_{x \to 4} \left(\frac{x^2 - 16}{x - 4} \right)$

8. $\lim_{x \to -2} \left(\frac{x^3 + 8}{x + 2} \right)$

9. $\lim_{x \to 4} \left(\frac{x^3 - 64}{x - 4} \right)$

10. $\lim_{x \to 4} \left(\frac{x - 4}{\sqrt{x} - 2} \right)$

11. $\lim_{x \to 2} \left(\frac{\sqrt{x} - 2}{x - 2} \right)$

12. $\lim_{x \to -1} \left(\frac{\sqrt{2 + x} - 1}{x + 1} \right)$