Practice Problems

1. a) Find $\lim_{x \to 0} \frac{5}{x^2}$

The limit approaches infinity. (∞)

b) Justify your answer with a graph, calculations near x = 0, and/or a verbal explanation.

As x gets smaller and smaller, x^2 gets even smaller, and when you take a number and divide by a smaller and smaller number the quotient gets really big-- like asking how many times does .000000001 go into 5-- the answer is a lot!

If you graph it, you will see a vertical asymptote at x = 0, indicating that the function value goes to ∞.

If you calculate it, for example x = .0001, then $5/x^2 = 500000000$

c) Find $\lim_{x \to \infty} \frac{5}{x^2}$

The limit approaches 0.

d) Justify your answer with a graph, calculations as x approaches infinity, and/or a verbal explanation.

As x gets very big, you are dividing 5 into very very many pieces, and so each is very very very small- almost zero.

If you graph it, you will see a horizontal asymptote. As you go farther and farther to the right, the graph is getting very flat, and almost hitting 0.

If you calculate it, for example x = 100,000, then $5/x^2 = .0000000005$

2. a) Find $\lim_{x \to 4} \frac{x^2 - 7x + 12}{x - 4}$

The answer is 1.

b) Describe the graph at x = 4

There is a hole at x = 4

c) Why can't you just evaluate the original expression at x = 4 to find the limit?

Because at x = 4, the denominator becomes 0 and you can't divide by 0.

Challenge question:

a) Find $\lim_{x \to 0} \frac{x + 5}{x}$

The limit approaches ∞.

b) Find $\lim_{x \to \infty} \frac{x + 5}{x}$

The limit approaches 1.