

Limits to Infinity Homework

Name: KEY

Determine the limit:

$$1. \lim_{x \rightarrow \infty} \frac{x+6}{2x^2-5} = 0$$

$$2. \lim_{x \rightarrow \infty} \frac{3x^3-2x+1}{4x^3+5} = \frac{3}{4}$$

$$3. \lim_{x \rightarrow \infty} \frac{5x^2-3x+1}{2x^2+4x-7} = \frac{5}{2}$$

$$4. \lim_{x \rightarrow \infty} \frac{4-7x}{2+3x} = -\frac{7}{3}$$

$$5. \lim_{x \rightarrow -\infty} \frac{2x^2-3}{4x^3+5x} = 0$$

$$6. \lim_{x \rightarrow \infty} \frac{(3x+4)(x-1)}{(x+2)(2x+7)} = \frac{3x^2+x-4}{2x^2+11x+14} = \frac{3}{2}$$

$$7. \lim_{x \rightarrow \infty} \frac{-x^3}{2x^2-3} = \frac{-}{+} = -\infty$$

$$8. \lim_{x \rightarrow \infty} \frac{x^3}{2x^2-3} = \frac{+}{+} = +\infty$$

$$9. \lim_{x \rightarrow \infty} \frac{2-x^2}{x+3} = \frac{-}{+} = -\infty$$

$$10. \lim_{x \rightarrow \infty} \frac{2-x^2}{x+3} = \frac{-}{+} = -\infty$$

$$11. \lim_{x \rightarrow \infty} \sqrt[3]{\frac{8+x^2}{x(x+1)}} = \sqrt[3]{\frac{8+x^2}{x^2+x}} = 1$$

$$12. \lim_{x \rightarrow \infty} \frac{4x-3}{\sqrt{x^2+1}} = 4$$

$$13. \lim_{x \rightarrow \infty} \sin(x) = \text{DNE}$$

$$14. \lim_{x \rightarrow \infty} \cos(x) = \text{DNE}$$

Limits to Infinity Homework

Evaluate the following one-sided limits.

$$1. \lim_{x \rightarrow 2^+} \frac{3}{x-2} = \frac{+}{+} = \infty$$

$$2. \lim_{x \rightarrow 2^-} \frac{3}{x-2} = \frac{+}{-} = -\infty$$

$$3. \lim_{x \rightarrow 2^+} \frac{3}{(x-2)^2} = \frac{+}{+} = \infty$$

$$4. \lim_{x \rightarrow 5^+} \frac{3x-5}{5-x} = \frac{+}{-} = -\infty$$

$$5. \lim_{x \rightarrow 2^-} \frac{x+2}{x-2} = \frac{+}{-} = -\infty$$

$$6. \lim_{x \rightarrow 4^-} \frac{-3x}{x^2-16} = \frac{-}{-} = \infty$$

$$7. \lim_{x \rightarrow 3^-} \frac{2x}{(x-3)^2} = \frac{+}{+} = \infty$$

$$8. \lim_{x \rightarrow 0^+} \frac{\sqrt{7+x^2}}{2x} = \frac{+}{+} = \infty$$

Evaluate the limits: you will need to check BOTH sides for the final answer.

$$9. \lim_{x \rightarrow 4} \frac{1}{4-x} \quad \left. \begin{array}{l} \lim_{x \rightarrow 4^+} \frac{1}{4-x} = \frac{+}{-} = -\infty \\ \lim_{x \rightarrow 4^-} \frac{1}{4-x} = \frac{+}{+} = \infty \end{array} \right\} \lim_{x \rightarrow 4} \frac{1}{4-x} = \text{DNE}$$

$$10. \lim_{x \rightarrow 5} \frac{x^2-5x}{x^2-25} = \lim_{x \rightarrow 5} \frac{x(x-5)}{(x+5)(x-5)} \Rightarrow \lim_{x \rightarrow 5} \frac{x}{x+5} = \frac{5}{10} = \frac{1}{2}$$

Hole!

$$11. \lim_{x \rightarrow 4} \frac{3}{(x-4)^2} \quad \left. \begin{array}{l} \lim_{x \rightarrow 4^+} \frac{3}{(x-4)^2} = \frac{+}{+} = \infty \\ \lim_{x \rightarrow 4^-} \frac{3}{(x-4)^2} = \frac{+}{+} = \infty \end{array} \right\} \lim_{x \rightarrow 4} \frac{3}{(x-4)^2} = \infty$$