

Take the following functions and categorize them based on their limits as x approaches infinity and negative infinity.

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

3_2

$\lim = \infty$

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

-4_3

$\lim = \infty$

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

1_4

$\lim = \infty$

4. $\lim_{x \rightarrow -\infty} -6x^5 + 4x^2 - 3$

-6_5

$\lim = \infty$

5. $\lim_{x \rightarrow \infty} x^3 - 10x^2 + 7x - 5$

1_3

$\lim = \infty$

6. $\lim_{x \rightarrow -\infty} -2x^4 + 8x - 6$

-2_4

$\lim = -\infty$

7. $\lim_{x \rightarrow \infty} -x^6 + 3x^2 - 1$

-1_6

$\lim = -\infty$

8. $\lim_{x \rightarrow -\infty} 5x^7 - x^3 + 9$

5_7

$\lim = -\infty$

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

$\lim = \frac{3}{1}$

10. $\lim_{x \rightarrow -\infty} \frac{5x^3 - 2}{-2x^3 + 8}$

$\lim = \frac{5}{-2}$

11. $\lim_{x \rightarrow \infty} \frac{x}{x^2 + 1}$

$\lim = 0$

12. $\lim_{x \rightarrow -\infty} \frac{4x^6 + 9}{-x^8 + 2}$

$\lim = 0$

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

$\lim = \frac{1}{3}$

14. $\lim_{x \rightarrow \infty} 3^x$

$\lim = \infty$

15. $\lim_{x \rightarrow -\infty} 2^x$

$\lim = 0$

16. $\lim_{x \rightarrow \infty} e^{-x}$ or $\frac{1}{e^x} = 0$

17. $\lim_{x \rightarrow -\infty} e^x = 0$

18. $\lim_{x \rightarrow \infty} 5e^{-0.5x}$ or $\frac{1}{5e^{0.5x}} \lim = 0$

19. $\lim_{x \rightarrow -\infty} 4e^{2x} = 0$

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

Create-Your-Own "Evaluating Limits Study Guide"

What it **must** include:

- **Limits of Polynomial Functions**

- ✓ ☒ Direct Evaluation with values of x
- ✓ ☒ At least one example of the algebraic process with a visual
- o ✓ Rules for Evaluating Limits of Polynomial Functions as x approaches infinity and negative infinity

examples ↓

- **Limits of Rational Functions**

- ✓ ☒ Direct Evaluation as the function approaches infinity and negative infinity
- ✓ ☒ One example of each type of rational function with the algebraic process
- o ✓ Rules for Evaluating Limits of Rational Functions as x approaches infinity and negative infinity
- ✓ ☒ One (different) example of each type of rational function and how the rule is applied
- ✓ Discriminant Forms – What are they, and how do they relate to evaluating limits of Rational Functions as x approaches infinity and negative infinity?

- **Limits of Exponential Functions**

- o ✓ Rules for Evaluating Limits of Rational Functions as x approaches infinity and negative infinity
- ☒ One (different) example of each type of rational function and how the rule is applied

The visual representation of the limit rules is intended to serve as a study guide and notes for your upcoming assessment on limits.

As you are creating your guide, be creative! Think of a way to create your guide and express your rules for evaluating limits in a way that will be most helpful to you.