The Long Run Behavior of Polynomial and Rational Functions

TIP: Cover up part of the graph so that you only focus on **end** behavior.

1. $y = \dfrac{4x^6}{5}$ looks most like Choice ___.

2. $y = \dfrac{3}{2x^3}$ looks most like Choice ___.

3. $y = \dfrac{-2}{3}$ looks most like Choice ___.

4. $y = \dfrac{6x^3}{2x^5}$ looks most like Choice ___.

5. $y = -2x^5 + 3x^2 - 5$ looks like $y =$ [ ] as $x \to \pm\infty$

   It has the same **end behavior** as Choice ___.

6. $y = 6x^3 + 2x - 6$ looks like $y =$ [ ] as $x \to \pm\infty$

   It has the same **end behavior** as Choice ___.

7. $y = \dfrac{6x^3 + 2x - 6}{2x^5 + 3x^2 - 5}$ looks like $y =$ [ ] as $x \to \pm\infty$

   It has the same **end behavior** as Choice ___.

8. $y = \dfrac{5x^9 - 3x^3 + 2}{x^5 - 6x^2}$ looks like $y =$ [ ] as $x \to \pm\infty$

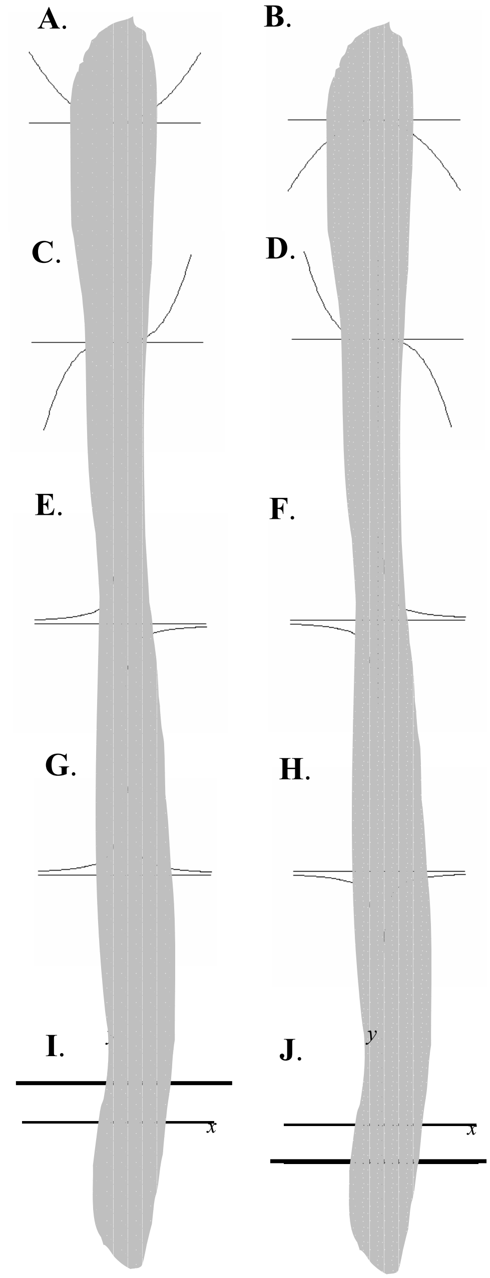
   It has the same **end behavior** as Choice ___.

9. $y = \dfrac{5 - x + 2x^2 - 2x^5}{2x^3 + 3x^5}$ looks like $y =$ [ ] as $x \to \pm\infty$

   It has the same **end behavior** as Choice ___.

10. $y = \dfrac{3x+1}{4x+1}$ looks like $y =$ [ ] as $x \to \pm\infty$

    It has the same **end behavior** as Choice ___.



The three cases for end behavior of rational functions

Assume a and b are any constants, and n and p are positive integers.

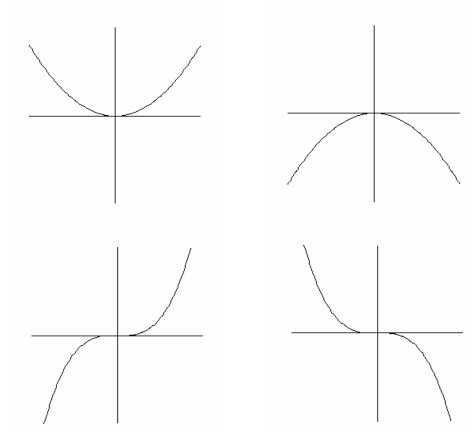
Then as $x \to \pm\infty$, $f(x) = \dfrac{ax^m + \text{ remaining terms}}{bx^n + \text{ remaining terms}}$ has the same **end behavior** as $y = \dfrac{ax^m}{bx^n}$.

This simplifies to three cases:

$y = \dfrac{a}{bx^p}$ $\qquad y = \dfrac{ax^p}{b}$ $\qquad y = \dfrac{ax^p}{bx^p} = \dfrac{a}{b}$

Match the equation to the set of possible graphs which have the same **end behavior**.

I



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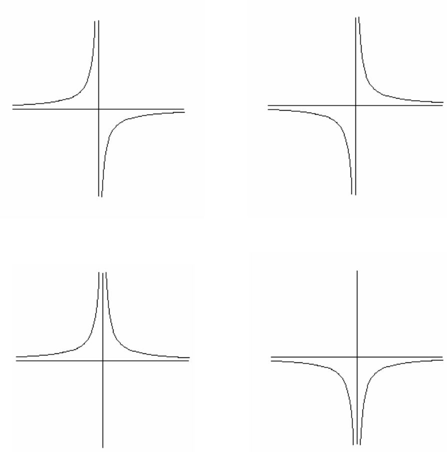
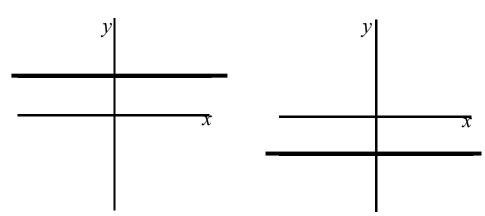


III



Report the horizontal asymptote, if any, for each of the above cases.