Long Run Behavior of Rational Functions

Section 2.5

A   B   C   D   E   F   G   H   I   J   K   L

or   or   or   or   or   or   or   or   or   or   or
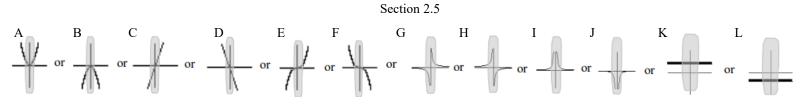
Without a grapher, select the letter which has the same long run behavior. Find the limits at $-\infty$ and at ∞.

Report the horizontal asymptote, if any exist. If none, so state.   H.A.

A $a(x) = \dfrac{2600x^{11} + 14x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5}{x^7 - 3500x^4 - 13x^3 + 8x^2 + 4x - 4} \rightarrow \dfrac{2600x^{11}}{x^7} = 2600x^4$ as $x \rightarrow \pm\infty$ None

I $b(x) = \dfrac{x^7 - 3500x^4 - 13x^3 + 8x^2 + 4x - 4}{2600x^{11} + 14x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5} \rightarrow \dfrac{x^7}{2600x^{11}} = \dfrac{1}{2600x^4} \rightarrow 0$ as $x \rightarrow \pm\infty$ $y = 0$

K $c(x) = \dfrac{2600x^{11} + 14x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5}{3500x^{11} - 13x^3 + 8x^2 + 4x - 4} \rightarrow \dfrac{2600x^{11}}{3500x^{11}} = \dfrac{26}{35}$ as $x \rightarrow \pm\infty$ $y = \dfrac{26}{35}$

B $d(x) = -\dfrac{2600x^{11} + 14x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5}{x^7 - 3500x^4 - 13x^3 + 8x^2 + 4x - 4} \rightarrow -\dfrac{2600x^{11}}{x^7} = -2600x^4$ as $x \rightarrow \pm\infty$ None

J $e(x) = -\dfrac{x^7 - 3500x^4 - 13x^3 + 8x^2 + 4x - 4}{2600x^{11} + 14x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5} \rightarrow -\dfrac{x^7}{2600x^{11}} = -\dfrac{1}{2600x^4} \rightarrow 0$ as $x \rightarrow \pm\infty$ $y = 0$

L $f(x) = \dfrac{-3500x^{10} - 13x^3 + 8x^2 + 4x - 4}{100x^{10} + 2x^9 + 8x^7 - 13x^2 - 13x + 5} \rightarrow \dfrac{-3500x^{10}}{100x^{10}} = -35$ as $x \rightarrow \pm\infty$ $y = -35$

C $g(x) = \dfrac{500x^{10} - 13x^3 + 8x^2 + 4x - 4}{2x^9 + 8x^7 + 13x^6 - 13x^2 - 13x + 5} \rightarrow \dfrac{500x^{10}}{2x^9} = 250x$ as $x \rightarrow \pm\infty.$ None

G $h(x) = \dfrac{2x^9 + 8x^7 + 13x^6 - 13x^2 - 13x + 5}{500x^{10} - 13x^3 + 8x^2 + 4x - 4} \rightarrow \dfrac{2x^9}{500x^{10}} = \dfrac{1}{250x} \rightarrow 0$ as $x \rightarrow \pm\infty.$ $y = 0$