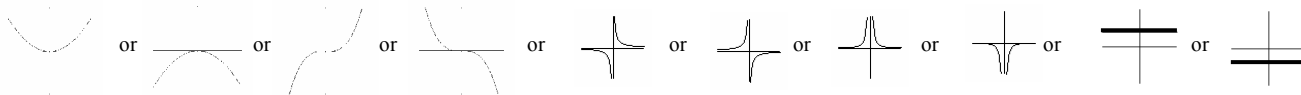


For each rational function in Questions 1-5,

- Find the power function it most closely resembles for very large values of  $x$ .
- Describe the **long run** behavior by completing the boxes:

As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$

- Sketch the power function which has the same **long run** behavior. Pick from these choices:



- Find the horizontal asymptote, if there is one. If none, state so.

1.  $f(x) = \frac{8x^3 + 5x - 9}{4x^7 + 200x^2 - 6}$

- Power function model:  $y = \underline{\hspace{2cm}}$  (simplify)
- As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$
- Graph of power function with same long run behavior:
- horizontal asymptote:

2.  $f(x) = \frac{36x^3 + 3x - 7}{x^2 - 4x^3}$

- Power function model:  $y = \underline{\hspace{2cm}}$  (simplify)
- As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$
- Graph of power function with same long run behavior:
- horizontal asymptote:

3.  $f(x) = \frac{3 + 4x}{2 + 7x}$

- Power function model:  $y = \underline{\hspace{2cm}}$  (simplify)
- As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$
- Graph of power function with same long run behavior:
- horizontal asymptote:

4.  $f(x) = \frac{10x^6 - 4x}{(x-3)(x-4)}$

- Power function model:  $y = \underline{\hspace{2cm}}$  (simplify)
- As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$
- Graph of power function with same long run behavior:
- horizontal asymptote:

5.  $f(x) = \frac{2(x-2)^2(x-6)}{9(x-5)^3}$

- Power function model:  $y = \underline{\hspace{2cm}}$  (simplify)
- As  $x \rightarrow -\infty$ , then  $y \rightarrow \square$ ; as  $x \rightarrow \infty$ , then  $y \rightarrow \square$
- Graph of power function with same long run behavior:
- horizontal asymptote:

For the functions below, report the horizontal asymptote, if there is one. If none, state so.

6.  $f(x) = \frac{7(x+2)(x+5)}{11(x-5)}$

9.  $f(x) = \frac{6x}{3x^2 + 10} + 2$

7.  $f(x) = \frac{12x^2 + 1}{3x^2 + 2} + 3$

10.  $f(x) = \frac{3(x+5)^2(x-4)}{4(x-6)^3(x-1)}$

8.  $f(x) = \frac{25x^2 + 38}{x(1 + 0.02x)}$