Q1

Thursday, September 3, 2020 7:43 PM

(a) Can the graph of $y = f(x)$ intersect a vertical asymptote?

- (●) Yes
- ( ) No

Can it intersect a horizontal asymptote?

- (●) Yes
- ( ) No

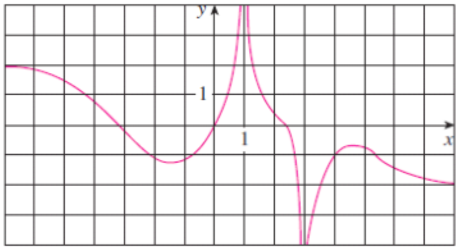
(b) How many horizontal asymptotes can the graph of $y = f(x)$ have? (Select all that apply.)

- ☑ 0
- ☑ 1
- ☑ 2
- ☐ 3
- ☐ 4

Q2

Thursday, September 3, 2020 7:54 PM

For the function f whose graph is given, state the following.



(a) $\lim_{x \to \infty} f(x)$

-2

(b) $\lim_{x \to -\infty} f(x)$

2

(c) $\lim_{x \to 1} f(x)$

∞

(d) $\lim_{x \to 3} f(x)$

$-\infty$

(e) the equations of the asymptotes (Enter your answers as a comma-separated list of equations.)

vertical $x = 1, x = 3$

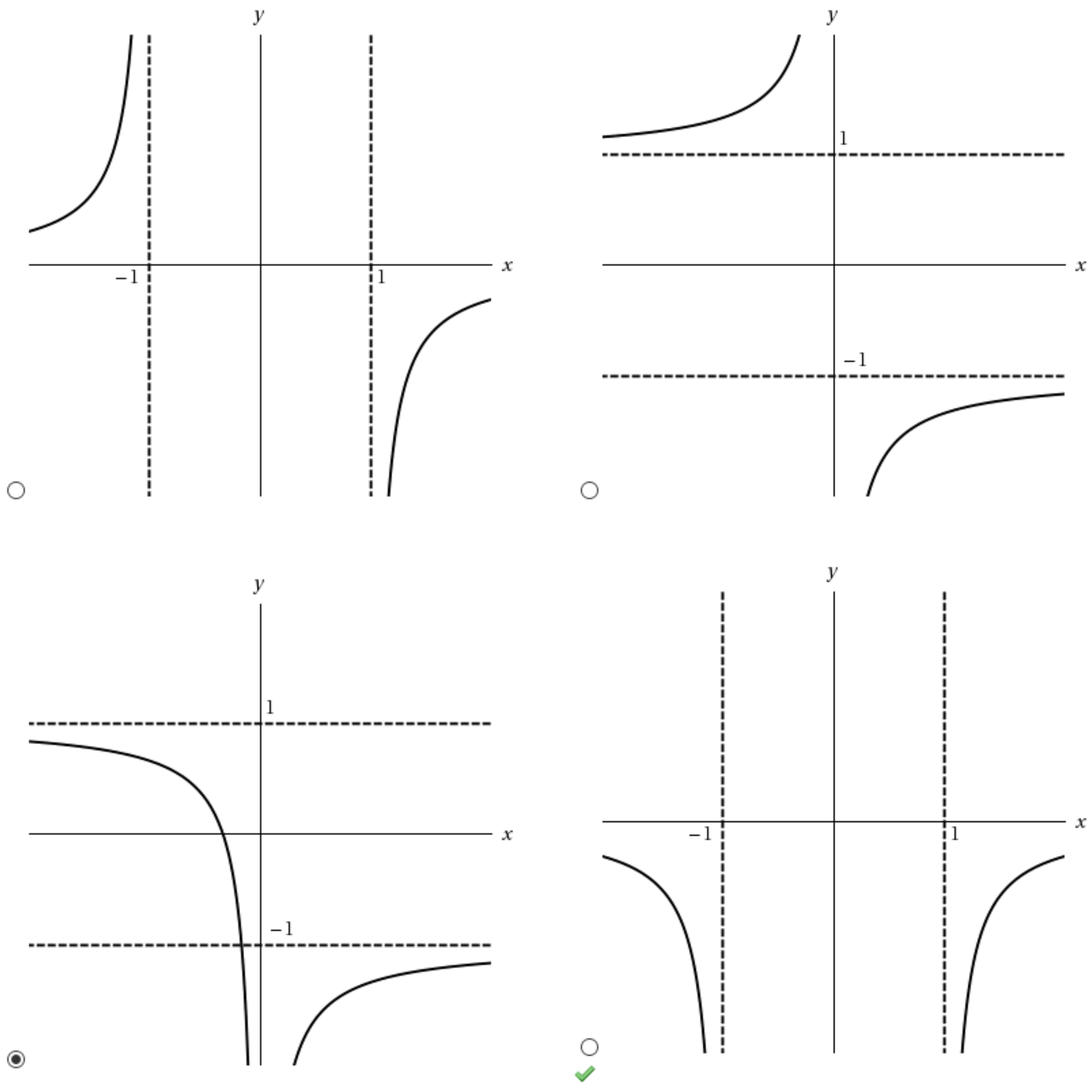
horizontal $y = -2, y = 2$

Q3

Thursday, September 3, 2020 8:06 PM

Sketch the graph of an example of a function that satisfies all of the given conditions.

$$\lim_{x \to 0} f(x) = -\infty, \quad \lim_{x \to -\infty} f(x) = 1, \quad \lim_{x \to \infty} f(x) = -1$$

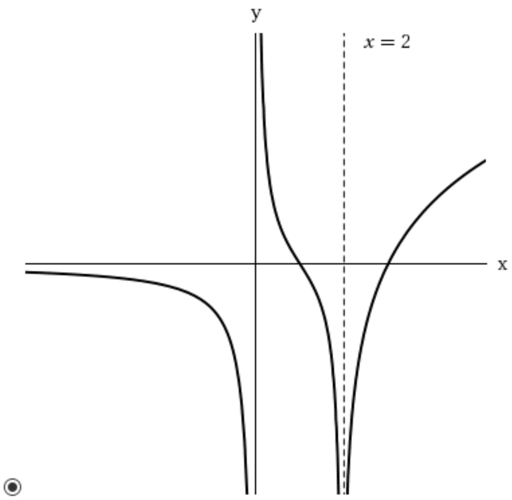


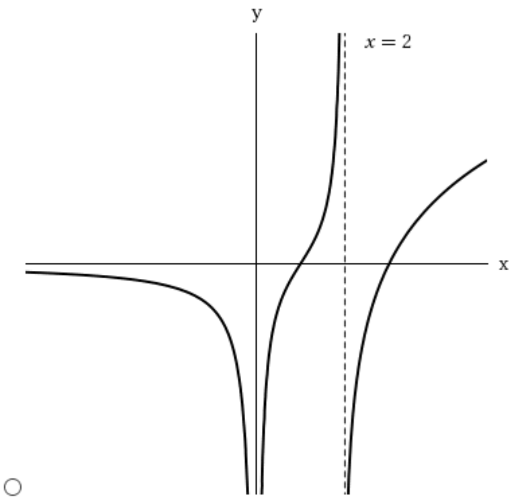
Q4

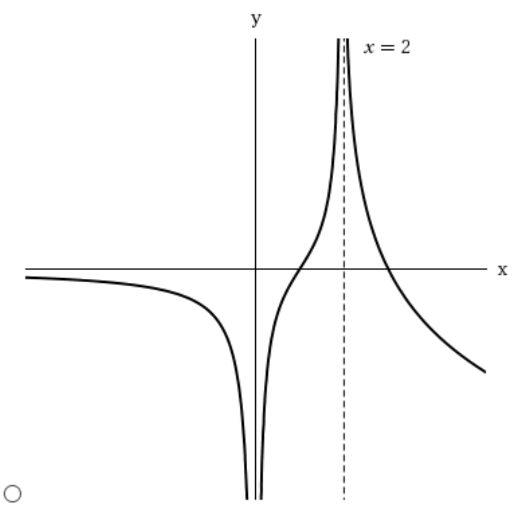
Thursday, September 3, 2020 9:55 PM

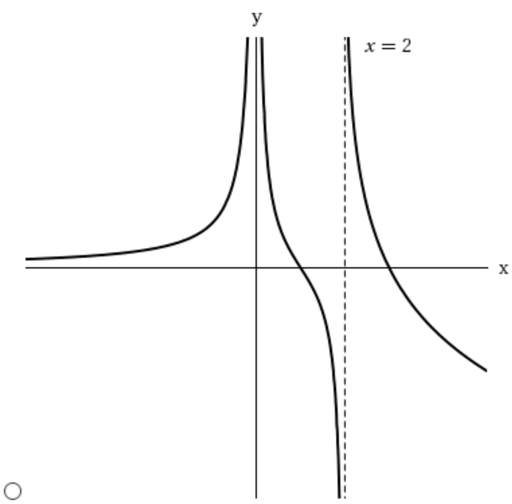
Sketch the graph of an example of a function that satisfies all of the given conditions.

$$\lim_{x \to 2} f(x) = -\infty, \quad \lim_{x \to \infty} f(x) = \infty, \quad \lim_{x \to -\infty} f(x) = 0, \quad \lim_{x \to 0^+} f(x) = \infty, \quad \lim_{x \to 0^-} f(x) = -\infty$$









Q5

Thursday, September 3, 2020 9:56 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to \infty} \frac{3x - 5}{2x + 6}$$

$\frac{3}{2}$

$$\lim_{x \to \infty} \frac{3x - 5}{2x + 6}$$

Take highest terms

$$\frac{3\cancel{x}}{2\cancel{x}} \to \boxed{\frac{3}{2}}$$

Q6

Thursday, September 3, 2020 10:00 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to -\infty} \frac{x - 2}{x^2 + 5}$$

0

$$\lim_{x \to -\infty} \frac{x-2}{x^2+5}$$

Take highest terms

$$\frac{x}{x^2} \to \boxed{0}$$

bigger exponent in denominator should get closer to zero (0)

Q7

Thursday, September 3, 2020 10:03 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{t \to \infty} \frac{\sqrt{t} + t^2}{3t - t^2}$$

−1 ✓

$$\lim_{t \to \infty} \frac{\sqrt{t} + t^2}{3t - t^2}$$

Take highest terms

$$\frac{t^2}{-t^2} \rightarrow \boxed{1}$$

Q8

Thursday, September 3, 2020 10:07 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to \infty} \frac{x^2}{\sqrt{x^4 + 5}}$$

1

$$\lim_{x \to \infty} \frac{x^2}{\sqrt{x^4 + 5}}$$

$\downarrow$ Take highest terms

$$\frac{x^2}{\sqrt{x^4}} = \frac{x^2}{x^2} \rightarrow \boxed{1}$$

Q9

Thursday, September 3, 2020 10:10 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x\to\infty} \frac{\sqrt{x+2x^2}}{6x-1}$$

$\frac{\sqrt{2}}{6}$

$$\lim_{x\to\infty} \frac{\sqrt{x+2x^2}}{6x-1}$$

$\downarrow$ Take highest terms

$$\frac{\sqrt{2x^2}}{6x} = \frac{\sqrt{2}\,\cancel{x}}{6\cancel{x}} \rightarrow \boxed{\frac{\sqrt{2}}{6}}$$

Q10

Thursday, September 3, 2020 10:14 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to \infty} \sqrt{x^2 + 1}$$

DNE

Q11

Thursday, September 3, 2020 10:15 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to \infty} \frac{x^4 - 3x^2 + x}{x^3 - x + 6}$$

DNE

$$\lim_{x \to \infty} \frac{x^4 - 3x^2 + x}{x^3 - x + 6}$$

$$= \frac{(x^4 - 3x^2 + x)\frac{1}{x^3}}{x^3 - x + 6 \quad \frac{1}{x^3}}$$

$$= \frac{x - \frac{3}{x} + \frac{1}{x^2}}{1 - \frac{1}{x^2} \quad \frac{2}{x^3}}$$

$$= \frac{\infty}{1} = \infty = \boxed{DNE}$$

Q12

Thursday, September 3, 2020 10:23 PM

Find the limit, if it exists. (If an answer does not exist, enter DNE.)

$$\lim_{x \to -\infty} (x^2 + 2x^7)$$

DNE

Q13

Thursday, September 3, 2020 10:25 PM

Find the horizontal and vertical asymptotes of the curve.

$$y = \frac{3x^2 + x - 5}{x^2 + x - 42}$$

$x =$ -7 (smaller x-value)

$x =$ 6 (larger x-value)

$y =$ 3

Graph with calculator

$$y = \frac{3x^2 + x - 5}{x^2 + x - 42}$$

Take highest terms

$$\frac{3\cancel{x^2}}{\cancel{x^2}} = 3 \longrightarrow y = 3$$

Q14

Thursday, September 3, 2020 10:33 PM

Find the horizontal and vertical asymptotes of the curve.

$$y = \frac{x^2 - x}{x^2 - 4x + 3}$$

$x =$ 3

$y =$ 1

$$y = \frac{x^2 - x}{x^2 - 4x + 3}$$

Take highest terms

$$\frac{x^2}{x^2} = 1 \rightarrow y = 1$$

Q15

Thursday, September 3, 2020 10:40 PM

Let P and Q be polynomials with positive coefficients. Consider the limit below.

$$\lim_{x \to \infty} \frac{P(x)}{Q(x)}$$

(a) Find the limit if the degree of P is less than the degree of Q.

0 ✓

(b) Find the limit if the degree of P is greater than the degree of Q.

∞ ✓

Q16

Thursday, September 3, 2020 10:41 PM

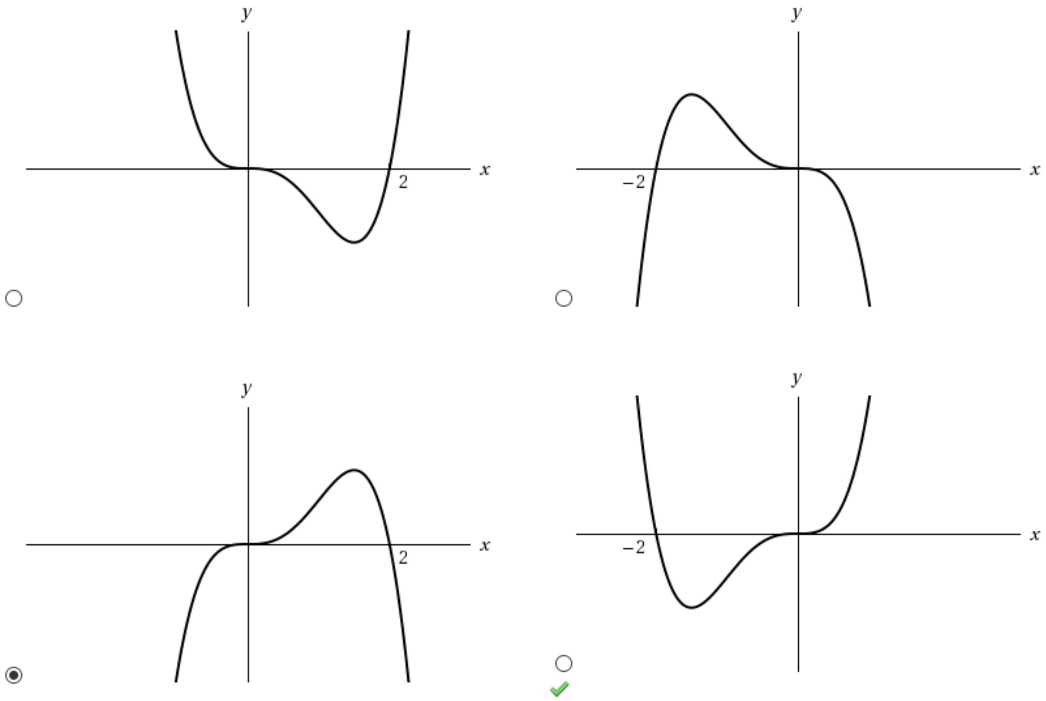
Find the limits as $x \to \infty$ and as $x \to -\infty$.

$$y = f(x) = 2x^3 - x^4$$

$\lim_{x \to \infty} f(x) =$ $-\infty$

$\lim_{x \to -\infty} f(x) =$ $-\infty$

Use this information, together with intercepts, to give a rough sketch of the graph as in Example 12.



$$\lim_{x \to \infty} \frac{2x^3}{\infty} - \frac{x^4}{-\infty} = \boxed{-\infty}$$

$$\lim_{x \to -\infty} \frac{2x^3}{-\infty} - \frac{x^4}{\infty} = \boxed{-\infty}$$

Q17

Thursday, September 3, 2020 10:49 PM

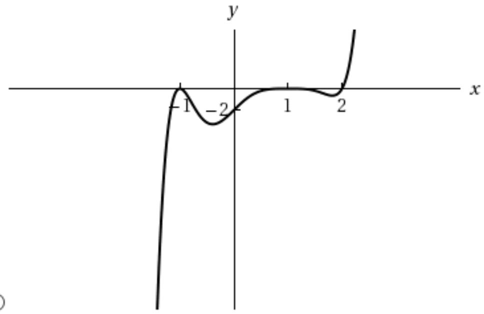
Find the limits as $x \to \infty$ and as $x \to -\infty$.

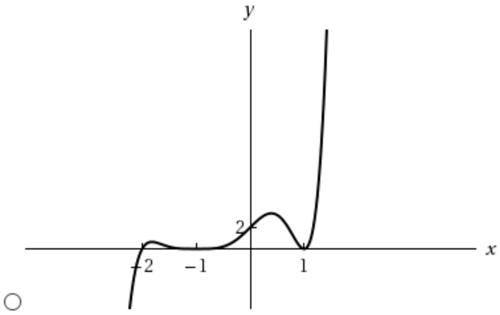
$$y = f(x) = (2 - x)(1 + x)^2(1 - x)^4$$

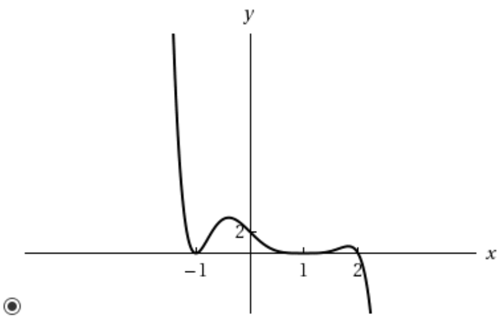
$\lim_{x \to \infty} f(x) =$ $-\infty$ ✓

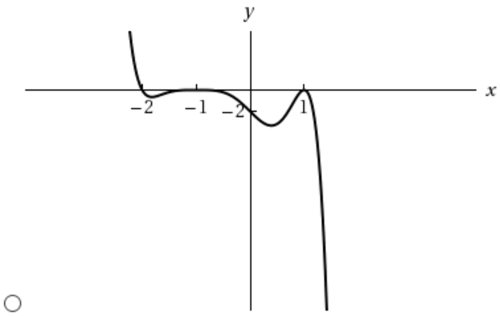
$\lim_{x \to -\infty} f(x) =$ ∞ ✓

Use this information, together with intercepts, to give a rough sketch of the graph as in Example 12.

○ 

○ 

◉ 

○ ✓ 

$$\lim_{x \to \infty} \underbrace{(2-x)}_{-\infty} \underbrace{(1+x)^2}_{\infty} \underbrace{(1-x)^4}_{\infty} \Rightarrow \boxed{-\infty}$$

Even exponent always makes positive numbers

$$\lim_{x \to -\infty} \underbrace{(2-x)}_{\infty} \underbrace{(1+x)^2}_{\infty} \underbrace{(1-x)^4}_{\infty} \Rightarrow \boxed{\infty}$$

y - intercept $f(0) = [2-(0)][1+(0)]^2[1-(0)]^4$

$= 2(1)^2(1)^4 = 3$

$f(x) = 0 \quad x = 2, \; x = -1, \; x = 1$