



Function Characteristics

- 1** Which function (based on its powers and coefficients) would have this end behaviour?
as $x \rightarrow -\infty, y \rightarrow -\infty$
as $x \rightarrow \infty, y \rightarrow \infty$

A $f(x) = 5x^3 + 4x^2 + 4x$

B $f(x) = -5x^3 + 4x^2 + 4x$

- 2** What end behaviour would this function have?

$$f(x) = -4x^5 - 2x^4 - 2x^3$$

A as $x \rightarrow -\infty, y \rightarrow -\infty$
as $x \rightarrow \infty, y \rightarrow \infty$

B as $x \rightarrow -\infty, y \rightarrow \infty$
as $x \rightarrow \infty, y \rightarrow -\infty$

- 3** Based on the order of polynomials in the numerator and denominator, what type of horizontal or slant asymptotes would this expression have?

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

A No horizontal or slant asymptote

B Horizontal asymptote (not at zero)

C Slant asymptote

D Horizontal asymptote (at zero)

- 4** What is the horizontal asymptote of this rational function?

$$f(x) = \frac{(x+1)}{(x+2)(x-2)}$$

A Horizontal asymptote at $y = 6$

B Horizontal asymptote at $y = 2$

C Horizontal asymptote at $y = -2$

D Horizontal asymptote at $y = 0$

- 5** Which set of values satisfies this inequality?

$$(x+1)x^5(x-3)^4 < 0$$

A $(-\infty, -1) \cup (-1, 0) \cup (0, \infty)$

B $(-\infty, -1) \cup (0, \infty)$

C $(-1, 0)$

D $(-\infty, -1) \cup (0, 3)$

- 6** Which set of values satisfies this inequality?

$$(x+3)x(x-2) > 0$$

A $(-3, 0) \cup (2, \infty)$

B $(-\infty, -3) \cup (0, 2)$

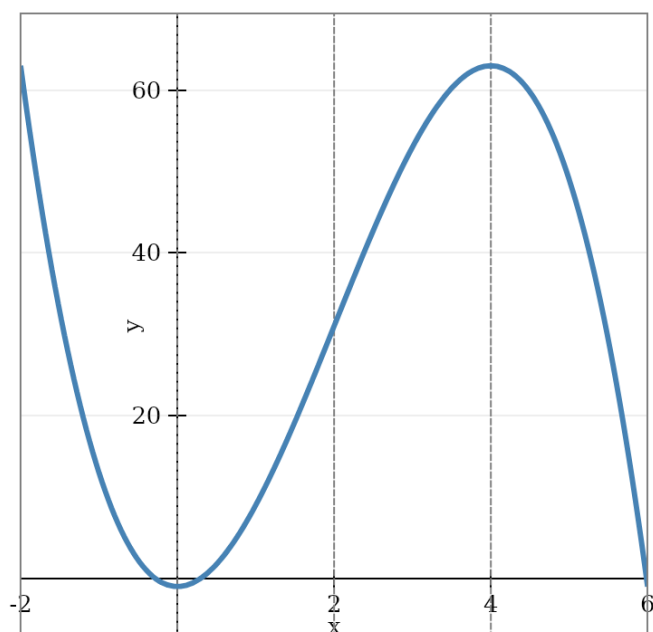
C $(-\infty, -3) \cup (-3, 0) \cup (0, 2) \cup (2, \infty)$

D $(-\infty, -4) \cup (-3, 0) \cup (2, \infty)$



Function Characteristics

7 On which interval(s) is the concavity negative?



A

$$(0, 2)$$

B

$$(-\infty, 0)$$

C

$$(2, 4) \cup (4, \infty)$$

D

$$(-\infty, 0) \cup (0, 2)$$

8 On which interval(s) is the function decreasing?

Interval	$f'(x)$	$f''(x)$
$(-\infty, 2)$	-	+
$(2, 3)$	+	+
$(3, 4)$	+	-
$(4, \infty)$	-	-

A

$$(2, 3) \cup (3, 4)$$

B

$$(-\infty, 2) \cup (4, \infty)$$

C

$$(3, 4) \cup (4, \infty)$$

D

$$(-\infty, 2) \cup (2, 3)$$



Function Characteristics

9 Which derivative chart is correct for the interval $(-\infty, -4)$?

$$f(x) = -2x^3 - 18x^2 - 48x - 4$$

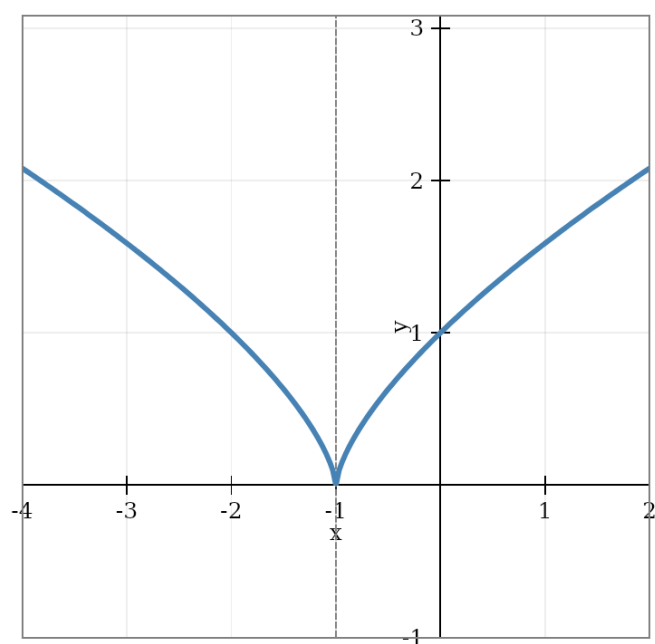
A

Interval	$f'(x)$	$f''(x)$
$(-\infty, -4)$	+	-
$(-4, -3)$	+	+
$(-3, -2)$	+	-
$(-2, \infty)$	-	-

B

Interval	$f'(x)$	$f''(x)$
$(-\infty, -4)$	-	+
$(-4, -3)$	+	+
$(-3, -2)$	+	-
$(-2, \infty)$	-	-

10 On which interval(s) is the first derivative positive?



A

$$(-1, \infty)$$

B

$$(-\infty, -1)$$



Function Characteristics

11 Which derivative chart matches this function?

$$f(x) = 2x^3 - 12x^2 + 18x + 3$$

A

Interval	$f'(x)$	$f''(x)$
$(-\infty, -1)$	+	-
$(-1, 2)$	-	-
$(2, 5)$	-	+
$(5, \infty)$	+	+

B

Interval	$f'(x)$	$f''(x)$
$(-\infty, 1)$	+	-
$(1, 2)$	-	-
$(2, 3)$	-	+
$(3, \infty)$	+	+

12 Which sign chart correctly shows the sign of this rational function on each interval?

$$\frac{(x+4)(x+1)}{x-3}$$

A

Interval	Sign
$(-\infty, -4)$	-
$(-4, -1)$	+
$(-1, 3)$	-
$(3, \infty)$	+

B

Interval	Sign
$(-\infty, -4)$	+
$(-4, -2)$	-
$(-2, -1)$	+
$(-1, 3)$	-
$(3, \infty)$	+

C

Interval	Sign
$(-\infty, -4)$	+
$(-4, -3)$	-
$(-3, -1)$	+
$(-1, 3)$	-
$(3, \infty)$	+

D

Interval	Sign
$(-\infty, -4)$	+
$(-4, -1)$	-
$(-1, 3)$	+
$(3, \infty)$	-



Function Characteristics

13 Which set of values satisfies this inequality?

$$\frac{(x-1)(x-2)(x-3)}{x+2} < 0$$

A

$$(-2, 1) \cup (2, 3)$$

B

$$(-\infty, -2) \cup (-2, 1) \cup (1, 2) \cup (2, 3) \cup (3, \infty)$$

C

$$(-\infty, -4) \cup (-2, 1) \cup (2, 3)$$

D

$$(-\infty, -2) \cup (1, 2) \cup (3, \infty)$$

14 Which set of values satisfies this inequality?

$$\frac{(x+1)x^4}{x-1} > 0$$

A

$$(-\infty, -1) \cup (1, \infty)$$

B

$$(-1, 1)$$

C

$$(-\infty, -1) \cup (-1, 1) \cup (1, \infty)$$

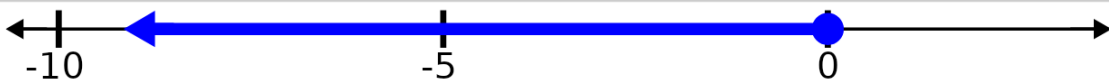
D

$$(-1, 0) \cup (1, \infty)$$

15 What number line shows the domain of this function?

$$f(x) = \frac{\sqrt{-1x-0}}{-1x+5}$$

A



B



16 What set describes the domain of this function?

$$f(x) = \frac{-1x-3}{\sqrt{1x-4}}$$

A

$$\{X \in \mathbb{R} | 4 < X\}$$

B

$$\{X \in \mathbb{R} | X < 4\}$$

17 What are the extreme values (y-values) on the interval?

A Maximum value 66, minimum value 0

B Maximum value 2, minimum value 66

C Maximum value 66, minimum value 2

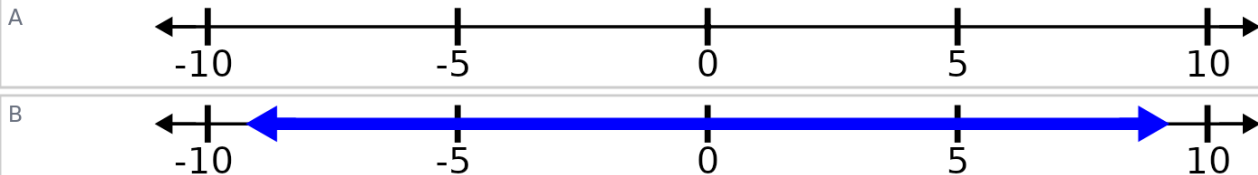
D Maximum value 68, minimum value 2



Function Characteristics

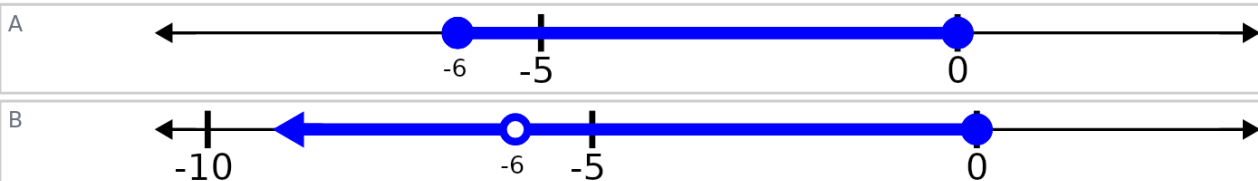
18 What number line shows the domain of this function?

$$f(x) = \frac{1x + 1}{\sqrt{-4x^2 + 3x - 13}}$$



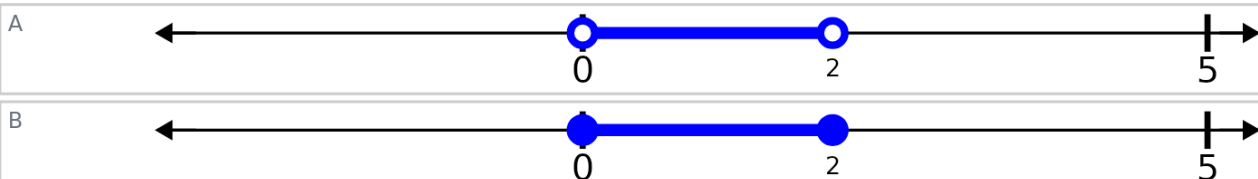
19 What number line shows the domain of this function?

$$f(x) = \frac{\sqrt{-1x - 0}}{-1x^2 - 5x + 6}$$



20 What number line shows the domain of this function?

$$f(x) = \frac{-2}{\sqrt{-1x^2 + 2x - 0}}$$



21 What is the absolute maximum point?

- A $(-6, -73)$
- B $(-1, -33)$
- C $(-2, -41)$
- D $(-4, -33)$

22 What is the inflection point?

- A $(-3, -35)$
- B $(-3, -34)$
- C $(-2, -35)$
- D $(-35, -3)$



Function Characteristics

23 Using the chart, is $x = 4$ a maximum, a minimum, or neither?

Interval	$f'(x)$	$f''(x)$
$(-\infty, 0)$	+	-
$(0, 2)$	-	-
$(2, 4)$	-	+
$(4, \infty)$	+	+

A

Minimum

B

Neither

C

Maximum

24 Using the chart, is it true that $x = 3$ is a maximum?

Interval	$f'(x)$	$f''(x)$
$(-\infty, 1)$	+	-
$(1, 2)$	-	-
$(2, 3)$	-	+
$(3, \infty)$	+	+

A

No

B

Yes



Function Characteristics

25 What is the critical value (y-value) of the inflection point?

A	-5	B	-4
C	-3	D	-2

27 What is the horizontal asymptote of this rational function?

$$f(x) = \frac{-4x - 16}{5x - 10}$$

A	Horizontal asymptote at $y = \frac{-4}{5}$
B	Horizontal asymptote at $y = 2$
C	Horizontal asymptote at $y = -6$
D	Horizontal asymptote at $y = 0$

29 Is there a hole or a vertical asymptote at $x=4$ when this polynomial is divided by this binomial?

$$f(x) = \frac{x^2 - 5x + 4}{x^2 - 4x}$$

A	Hole
B	Vertical Asymptote
C	Neither

26 What are the vertical asymptotes of this rational function?

$$f(x) = \frac{x^3 + x^2 - 16x - 16}{x^2 - 4}$$

A	Vertical asymptote at $x = -1$
B	Vertical asymptotes at $x = -2, x = 2$
C	Vertical asymptote at $x = 4$
D	Vertical asymptote at $x = -4$

28 Which rational function does not have a vertical asymptote?

Vertical Asymptote Does Not Exist

A	$f(x) = \frac{x}{(x-2)(x-4)}$
B	$f(x) = \frac{(x+4)x}{(x+3)(x+2)(x-1)}$
C	$f(x) = \frac{(x+2)(x-3)}{(x+2)}$
D	$f(x) = \frac{3(x+1)(x-2)}{3(x-1)(x-3)}$



Function Characteristics

30 Find the y intercept of this function
 $-30x - 6y = -30$

A 9	B 3	C 4
D 1	E 6	F 5

31 Find the x intercept of this function
 $-14.2x + 5.5y = -9.6$

A 2.2	B -0.84	C 0.68
D 3.72	E 2.96	F 1.44

32 Find the x intercept of this function
 $-18x - 3y = 54$

A -7	B 1	C -3
D -9	E -10	F -5

33 Find the x intercept of this function
 $y = 6x + 4.2$

A -3	B -1.5	C 0.8
D 2.3	E 0.1	F -0.7

34 Find the x intercept of this function
 $y = -3x - 9$

A -10	B 5	C -13
D 1	E -3	F -4

35 Find the y intercept of this function by setting x to zero and solving

$$-36x + 6y = 18.3$$

A 6.1	B 0.8	C 3.1
D 4.6	E 2.3	F 0

36 Find the y intercept of this function by setting x to zero and solving

$$y = -3x - 0$$

A 2	B 0	C -10
D -7	E 3	F -1

37 Find the y intercept of this function
 $y = 4x - 3.8$

A -6.1	B -3.8	C -4.6
D -3	E -6.8	F -1.5