

Determine concavity using the second derivative

- 1 Given the derivative shown, is the graph sloping down at $x = -1$?

$$f'(x) = -6x^2 + 12x$$

A Can't be determined

B No

C Yes

- 2 What does this tell you about the function at that point?

$$f'(2) = -30.$$

A The function is decreasing there.

B The function is concave down there.

C The function is increasing there.

D The function is concave up there.

- 3 What does this tell you about the derivatives at that point?

At $x = -2$, the function is concave up.

A $f'(x)$ is positive there

B $f''(x)$ is positive there

C $f'(x)$ is negative there

D $f''(x)$ is negative there

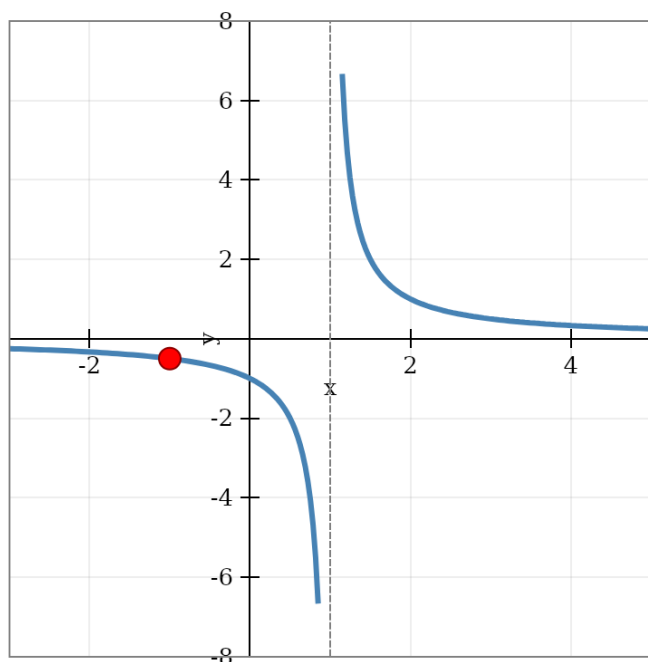
- 4 Is this polynomial positive or negative on the interval $(-2, 1)$?

$$(x + 2)(x - 1)$$

A Negative

B Positive

- 5 At the highlighted point, what are the signs of $f'(x)$ and $f''(x)$?



A $f'(x)$ negative, $f''(x)$ negative

B $f'(x)$ positive, $f''(x)$ positive

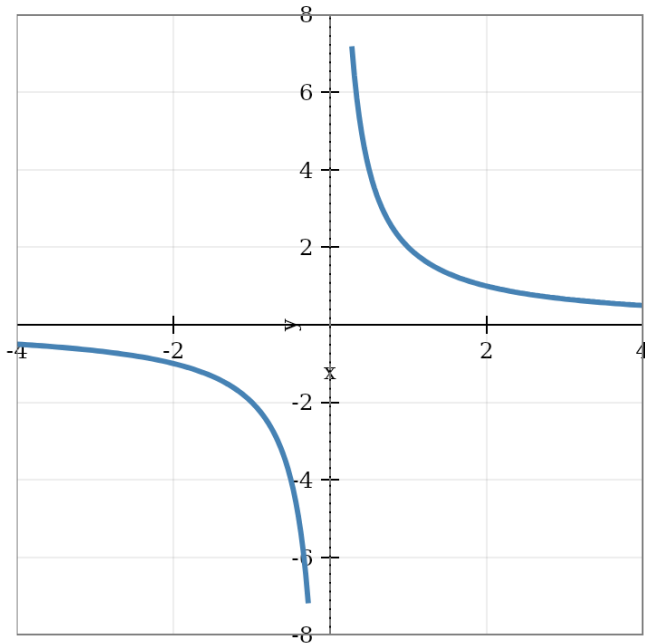
C $f'(x)$ positive, $f''(x)$ zero

D $f'(x)$ positive, $f''(x)$ negative



Determine concavity using the second derivative

6 On which interval(s) is the concavity positive?



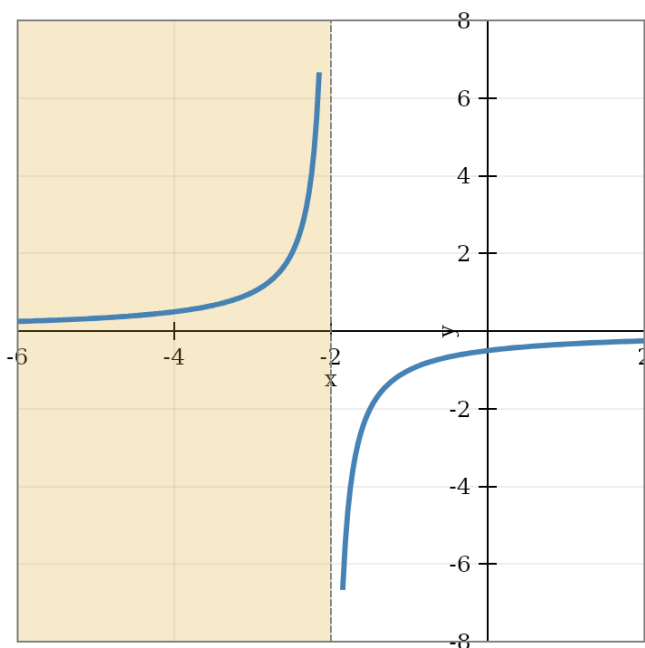
A

 $(0, \infty)$

B

 $(-\infty, 0)$

7 In the highlighted interval, is $f''(x)$ positive, negative, or zero?



A

Can't be determined

B

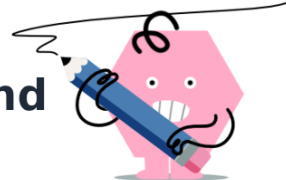
Zero

C

Positive

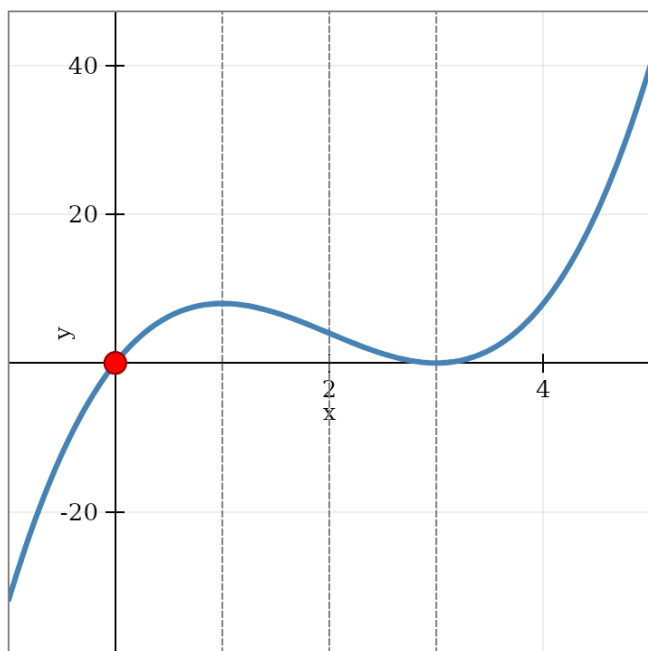
D

Negative



Determine concavity using the second derivative

8 At the highlighted point, is the concavity positive, negative, or zero?



A

Can't be determined

B

Positive

C

Zero

D

Negative

9 Find the derivative $f'(x)$ using the power rule.

if $f(x) = x^n$, $f'(x) = nx^{n-1}$

[12pt] $f(x) = x^6$

A

$$f'(x) = x^5$$

B

$$f'(x) = 6x^6$$

C

$$f'(x) = 6x^7$$

D

$$f'(x) = 6x^5$$

10 On the interval $(-\infty, 1)$, is the concavity positive or negative?

$$f(x) = -2x^3 + 12x^2 - 18x - 4$$

A

Negative

B

Positive

C

Can't be determined

11 On the interval $(-1, 0)$, what are the signs of the slope and concavity?

A

Slope negative, concavity positive

B

Slope positive, concavity negative

C

Slope positive, concavity positive

D

Slope negative, concavity negative



Determine concavity using the second derivative

12 On the interval $(-1, 1)$, is the concavity positive or negative?

A Negative

B Positive

C Can't be determined

13 Given the derivative shown, where is the graph sloping down?

$$f''(x) = 12x + 12$$

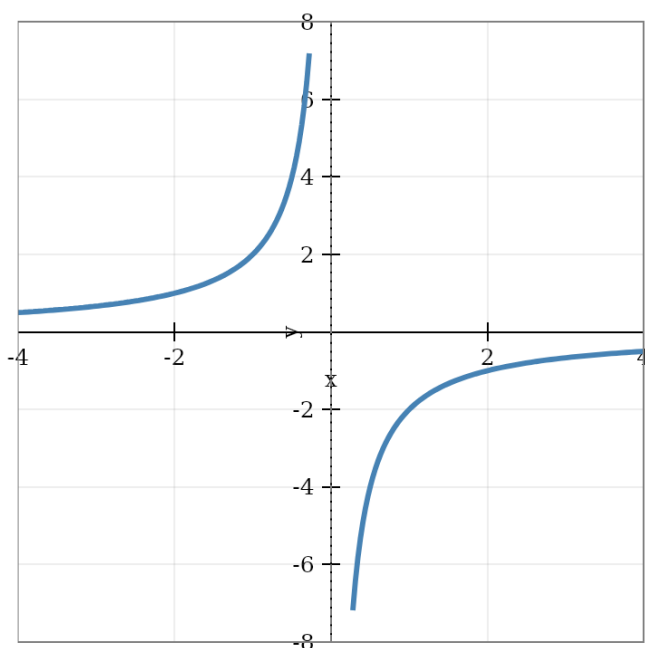
A $x < -3$ or $x > 1$

B $-3 < x < 1$

C $x > -1$

D can't be determined

14 On which interval(s) is the second derivative negative?



A

$(-\infty, 0)$

B

$(0, \infty)$

15 On the interval $(-\infty, -1)$, is $f'(x)$ positive, negative, or zero?

$$f(x) = 2x^3 - 6x^2 - 18x - 4$$

A Zero

B Negative

C Can't be determined

D Positive

16 On the interval $(-2, \infty)$, what are the signs of the slope and concavity?

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

A Slope positive, concavity negative

B Slope negative, concavity negative

C Slope negative, concavity positive

D Slope positive, concavity positive