

Exercise walk-through

5.7

Using the Second Derivative Test to Determine Extrema

AP Calculus AB

You must be able to

- use f'' at a critical point to classify a **local extremum**

1

The method

Method — Second Derivative Test

At a critical point c where $f'(c) = 0$:

- $f''(c) > 0 \rightarrow$ local **minimum** (concave up);
- $f''(c) < 0 \rightarrow$ local **maximum** (concave down);
- $f''(c) = 0 \rightarrow$ **inconclusive**.

Exercises 2.1·2.2

2.1 State the Second Derivative Test for a local minimum.

[1]

2.2 For $f(x) = x^2 - 4x$ with $f'' = 2$, classify the critical point.

[2]

Exercises 2.1-2.2

2.1 State the Second Derivative Test for a local minimum.

[1]

2.1

- if f'

(c)

- $= 0$ and f''

(c)

- > 0 , then c is a local minimum

2.2 For $f(x) = x^2 - 4x$ with $f'' = 2$, classify the critical point.

[2]

2.2

- $f'' = 2 > 0$, so it is a local minimum

Exercises 2.3-3.1

2.3 State when the test is inconclusive.

[1]

3.1 If $f'(c) = 0$ and $f''(c) < 0$, then c is a

[1]

☐

A local minimum

B local maximum

C inflection point

D nothing

Exercises 2.3-3.1

2.3 State when the test is inconclusive.

[1]

2.3

- when f''

(c)

- $= 0$

3.1 If $f'(c) = 0$ and $f''(c) < 0$, then c is a

[1]

☐

A local minimum

B local maximum

C inflection point

D nothing

3.1 B

- local maximum.

Exercise 3.2

3.2 If $f'(c) = 0$ and $f''(c) > 0$, then c is a

[1]

☐

A local maximum

B local minimum

C endpoint

D asymptote

Exercise 3.2

3.2 If $f'(c) = 0$ and $f''(c) > 0$, then c is a

[1]

☐

A local maximum

B local minimum

C endpoint

D asymptote

3.2 B

- local minimum.

Exercise 3.3 (a)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(a) Find $f''(x)$.

[1]

Exercise 3.3 (a)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(a) Find $f''(x)$.

[1]

(a)

- 2

Exercise 3.3 (b)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(b) Evaluate $f''(3)$.

[1]

Exercise 3.3 (b)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(b) Evaluate $f''(3)$.

[1]

(b)

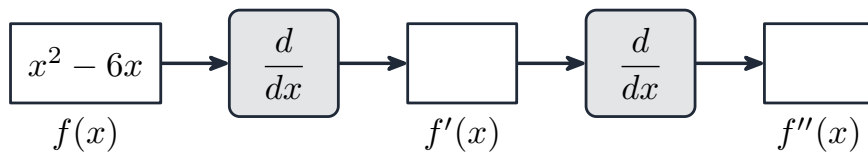
- $2 > 0$

Exercise 3.3 (c)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(c) Classify $x = 3$.

[1]

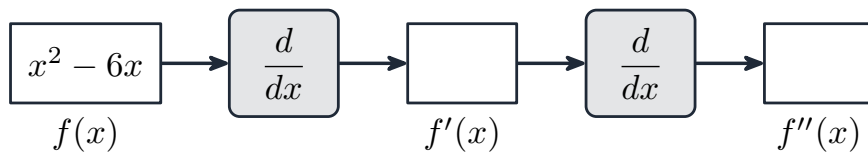


Exercise 3.3 (c)

3.3 $f(x) = x^2 - 6x$, with $f'(3) = 0$.

(c) Classify $x = 3$.

[1]



(c)

- local minimum