Exercise walk-through

5.7
Using the Second Derivative Test to Determine Extrema

AP Calculus BC

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 $f'(c) = 0$:

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

AP Calculus BC

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]

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(a)

- 2

Exercise 3.3 (b)

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(b) Evaluate $f''(3)$. [1]

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(b) Evaluate $f''(3)$. [1]

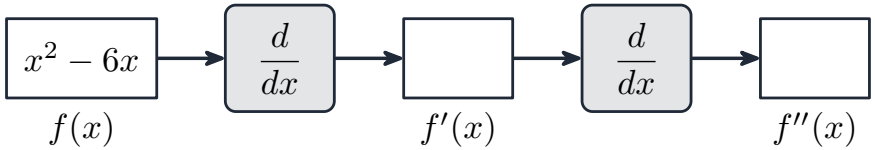
(b)

- $2 > 0$

Exercise 3.3 (c)

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

(c) Classify $x = 3$. [1]



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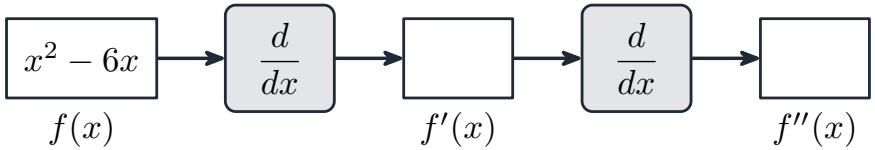

(c)

- local minimum