

## Calculus Practice: Use Derivatives to Analyze Functions 12a

For each problem, find all points of absolute minima and maxima on the given interval.

1)  $y = x^3 - 2x^2 + 2$ ;  $(-1, 1)$

A) Absolute minimum:  $(0, 2)$ Absolute maximum:  $\left(\frac{4}{3}, \frac{22}{27}\right)$ B) Absolute minimum:  $\left(\frac{4}{3}, \frac{22}{27}\right)$ Absolute maximum:  $(0, 2)$ 

C) No absolute minima.

No absolute maxima.

D) No absolute minima.

Absolute maximum:  $(0, 2)$ 

2)  $f(x) = x^4 - 4x^2 + 5$ ;  $(-1, 2]$

A) No absolute minima.

No absolute maxima.

B) Absolute minimum:  $(0, 5)$ Absolute maximum:  $(\sqrt{2}, 1)$ C) Absolute minimum:  $(\sqrt{2}, 1)$ Absolute maxima:  $(2, 5), (0, 5)$ D) Absolute minimum:  $(\sqrt{2}, 1)$ Absolute maximum:  $(-\sqrt{2}, 1)$ 

3)  $f(x) = -\frac{x^2}{2} - 4x - 7$ ;  $(-\infty, -7)$

A) Absolute minimum:  $(-2, -1)$ Absolute maximum:  $(-4, 1)$ B) Absolute minimum:  $\left(3, -\frac{47}{2}\right)$ Absolute maximum:  $(-4, 1)$ 

C) No absolute minima.

Absolute maximum:  $(-4, 1)$ 

D) No absolute minima.

No absolute maxima.

4)  $y = -x^2 - 6x - 6$ ;  $[-5, -3]$

A) No absolute minima.

No absolute maxima.

B) Absolute minimum:  $(-3, 3)$ Absolute maximum:  $(-5, -1)$ C) Absolute minimum:  $(-5, -1)$ Absolute maximum:  $(-3, 3)$ 

D) No absolute minima.

Absolute maximum:  $(-3, 3)$ 

5)  $f(x) = -x^4 + x^2 - 2$ ;  $[0, \infty)$

A) No absolute minima.

Absolute maximum:  $\left(\frac{\sqrt{2}}{2}, -\frac{7}{4}\right)$ 

B) No absolute minima.

No absolute maxima.

C) Absolute minimum:  $\left(-\frac{\sqrt{2}}{2}, -\frac{7}{4}\right)$ Absolute maximum:  $\left(\frac{\sqrt{2}}{2}, -\frac{7}{4}\right)$ D) Absolute minimum:  $\left(\frac{\sqrt{2}}{2}, -\frac{7}{4}\right)$ Absolute maximum:  $\left(-\frac{\sqrt{2}}{2}, -\frac{7}{4}\right)$ 

6)  $f(x) = x^4 - 2x^2 + 1$ ;  $[-1, 1]$

A) Absolute minimum:  $(1, 0)$ 

No absolute maxima.

B) No absolute minima.

No absolute maxima.

C) Absolute minima:  $(-1, 0), (1, 0)$ Absolute maximum:  $(0, 1)$ D) Absolute minimum:  $(1, 0)$ Absolute maximum:  $(0, 1)$

7)  $y = x^3 - 4x^2 + 5x - 5$ ;  $[0, 3]$

A) Absolute minimum:  $\left(\frac{5}{3}, -\frac{85}{27}\right)$

Absolute maximum:  $(1, -3)$

B) No absolute minima.

No absolute maxima.

C) Absolute minimum:  $\left(\frac{5}{3}, -\frac{85}{27}\right)$

Absolute maximum:  $(0, -5)$

D) Absolute minimum:  $(0, -5)$

Absolute maximum:  $(3, 1)$

9)  $y = 2x^2 - 8x + 8$ ;  $(1, 3]$

A) No absolute minima.

No absolute maxima.

B) Absolute minimum:  $(3, 2)$

Absolute maximum:  $(2, 0)$

C) Absolute minima:  $(1, 2), (3, 2)$

Absolute maximum:  $(2, 0)$

D) Absolute minimum:  $(2, 0)$

Absolute maximum:  $(3, 2)$

11)  $y = x^3 - x^2 - 1$ ;  $(2, \infty)$

A) Absolute minimum:  $\left(\frac{2}{3}, -\frac{31}{27}\right)$

Absolute maximum:  $(1, -1)$

B) Absolute minimum:  $\left(\frac{2}{3}, -\frac{31}{27}\right)$

Absolute maximum:  $(0, -1)$

C) No absolute minima.

No absolute maxima.

D) Absolute minimum:  $\left(\frac{2}{3}, -\frac{31}{27}\right)$

Absolute maximum:  $(3, 17)$

13)  $y = -x^4 + 3x^2 + 1$ ;  $[-2, 0)$

A) Absolute minimum:  $\left(\frac{\sqrt{6}}{2}, \frac{13}{4}\right)$

Absolute maximum:  $\left(-\frac{\sqrt{6}}{2}, \frac{13}{4}\right)$

B) Absolute minimum:  $(0, 1)$

Absolute maximum:  $\left(\frac{\sqrt{6}}{2}, \frac{13}{4}\right)$

C) Absolute minimum:  $(-2, -3)$

Absolute maximum:  $\left(-\frac{\sqrt{6}}{2}, \frac{13}{4}\right)$

D) No absolute minima.

No absolute maxima.

8)  $y = -x^3 + x^2 + 3$ ;  $(-1, 1]$

A) No absolute minima.

No absolute maxima.

B) Absolute minimum:  $\left(\frac{2}{3}, \frac{85}{27}\right)$

Absolute maximum:  $(1, 3)$

C) Absolute minima:  $(1, 3), (0, 3)$

No absolute maxima.

D) Absolute minimum:  $\left(\frac{2}{3}, \frac{85}{27}\right)$

No absolute maxima.

10)  $f(x) = 2x^2 - 12x + 13$ ;  $(3, 5)$

A) Absolute minimum:  $(3, -5)$

No absolute maxima.

B) Absolute minimum:  $(5, 3)$

Absolute maximum:  $(3, -5)$

C) No absolute minima.

Absolute maximum:  $(3, -5)$

D) No absolute minima.

No absolute maxima.

12)  $y = -x^4 + 4x^2 - 4$ ;  $[-2, 2]$

A) No absolute minima.

Absolute maximum:  $(\sqrt{2}, 0)$

B) Absolute minima:  $(-2, -4), (2, -4), (0, -4)$

Absolute maxima:  $(-\sqrt{2}, 0), (\sqrt{2}, 0)$

C) Absolute minimum:  $(0, -4)$

Absolute maximum:  $(\sqrt{2}, 0)$

D) No absolute minima.

No absolute maxima.

14)  $y = x^2 - 8x + 18$ ;  $[2, 4)$

A) No absolute minima.

Absolute maximum:  $(4, 2)$

B) Absolute minimum:  $(2, 6)$

Absolute maximum:  $(4, 2)$

C) No absolute minima.

Absolute maximum:  $(2, 6)$

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No absolute maxima.

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Absolute maxima:  $(-\sqrt{2}, 0), (\sqrt{2}, 0)$

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