

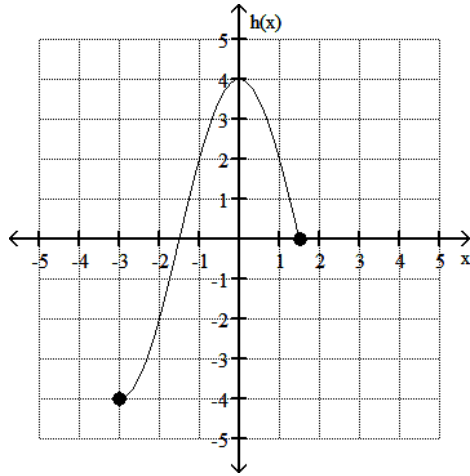
4.1: Extreme Values of Functions

4.2: The Mean Value Theorem

Find the location of the absolute extrema for the function.

1) Minimum, maximum

1) \_\_\_\_\_



A)  $x = -4, -1$

B)  $x = 0, 1.5$

C)  $x = -3, 0$

D)  $x = 0, -3$

Find the absolute extreme values of the function on the interval.

2)  $F(x) = -\frac{2}{x^2}, 0.5 \leq x \leq 2$

2) \_\_\_\_\_

A) absolute maximum is  $-\frac{1}{2}$  at  $x = \frac{1}{2}$ ; absolute minimum is  $-8$  at  $x = -2$

B) absolute maximum is  $-\frac{1}{2}$  at  $x = 2$ ; absolute minimum is  $-8$  at  $x = -\frac{1}{2}$

C) absolute maximum is  $-\frac{1}{2}$  at  $x = 2$ ; absolute minimum is  $-8$  at  $x = \frac{1}{2}$

D) absolute maximum is  $\frac{1}{2}$  at  $x = \frac{1}{2}$ ; absolute minimum is  $-8$  at  $x = 2$

Find the absolute extreme values of the function on the interval.

3)  $f(x) = \tan x, -\frac{\pi}{3} \leq x \leq \frac{\pi}{4}$

3) \_\_\_\_\_

A) absolute maximum is  $1$  at  $x = \frac{2\pi}{12}$ ; absolute minimum is  $-\sqrt{3}$  at  $x = -\frac{\pi}{6}$

B) absolute maximum is  $-\sqrt{3}$  at  $x = \frac{\pi}{4}$ ; absolute minimum is  $1$  at  $x = -\frac{\pi}{3}$

C) absolute maximum is  $1$  at  $x = \frac{\pi}{4}$ ; absolute minimum is  $-\sqrt{3}$  at  $x = -\frac{\pi}{3}$

D) absolute maximum is  $1$  at  $x = \frac{\pi}{4}$  and  $-\frac{\pi}{3}$ ; absolute minimum does not exist

- 4)  $f(x) = -4e^{-x^2}, -\infty < x < \infty$  4) \_\_\_\_\_
- A) Minimum value is  $-4$  at  $x = 0$ ; maximum value is  $-\frac{4}{e}$  at  $x = 1$
- B) Minimum value is  $-4$  at  $x = 0$ ; no maximum value
- C) No minimum value and no maximum value
- D) Maximum value is  $-4$  at  $x = 0$ ; minimum value

Determine all critical points for the function.

- 5)  $f(x) = 80x^3 - 3x^5$  5) \_\_\_\_\_
- A)  $x = -4$  B)  $x = -4$  and  $x = 4$
- C)  $x = 0, x = -4,$  and  $x = 4$  D)  $x = 4$

- 6)  $f(x) = \frac{5x}{x+1}$  6) \_\_\_\_\_
- A)  $x = 5$  and  $x = 0$  B)  $x = 1$  C)  $x = 0$  and  $x = -1$  D)  $x = -1$

Find the extreme values of the function and where they occur.

- 7)  $y = x^3 - 12x + 2$  7) \_\_\_\_\_
- A) Local maximum at  $(0, 0)$ .
- B) Local maximum at  $(-2, 18)$ , local minimum at  $(2, -14)$ .
- C) Local maximum at  $(2, -14)$ , local minimum at  $(-2, 18)$ .
- D) None

- 8)  $y = x^2e^x$  8) \_\_\_\_\_
- A) Minimum value is  $0$  at  $x = 0$ ; no maximum value.
- B) Minimum value is  $0$  at  $x = 0$ , maximum value is  $4e^{-2}$  at  $x = -2$ .
- C) Minimum value is  $4e^{-2}$  at  $x = -2$ ; no maximum value.
- D) None

Find the value or values of  $c$  that satisfy the equation  $\frac{f(b) - f(a)}{b - a} = f'(c)$  in the conclusion of the Mean Value Theorem for the function and interval.

- 9)  $f(x) = x + \frac{96}{x}, [6, 16]$  9) \_\_\_\_\_
- A)  $6, 16$  B)  $-4\sqrt{6}, 4\sqrt{6}$  C)  $4\sqrt{6}$  D)  $0, 4\sqrt{6}$
- 10)  $f(x) = \ln(x - 4), [5, 8]$  Round to the nearest thousandth. 10) \_\_\_\_\_
- A)  $6.731$  B)  $6.164$  C)  $\pm 6.164$  D)  $7.164$

Determine whether the function satisfies the hypotheses of the Mean Value Theorem for the given interval.

- 11)  $f(x) = x^{1/3}, [-2, 4]$  11) \_\_\_\_\_
- A) Yes B) No
- 12)  $g(x) = x^{3/4}, [0, 4]$  12) \_\_\_\_\_
- A) Yes B) No

Answer Key

Testname: PRACTICE15

- 1) C
- 2) C
- 3) C
- 4) B
- 5) C
- 6) D
- 7) B
- 8) B
- 9) C
- 10) B
- 11) B
- 12) A