Calculus Practice: Use Derivatives to Analyze Functions 12b

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

1) $y = -\frac{x^2}{2} - 3x - \frac{9}{2}$; $[-3, -1]$

2) $y = x^2 - 6x + 4$; $[0, 4]$

3) $y = -x^3 + 7x^2 - 16x + 8$; $[1, 3]$

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

5) $y = -x^4 + 4x^2 + 2$; $[-1, 1]$

6) $f(x) = x^4 - 3x^2 + 4$; $(-1, 1)$

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

8) $f(x) = x^4 - 3x^2 - 3$; $[0, \infty)$

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

10) $y = x^2 - 2x - 1$; $[1, \infty)$

11) $f(x) = 2x^2 - 4x - 4$; $[-1, 2)$

12) $y = x^4 - 2x^2 + 2$; $(-1, 1)$

13) $y = \frac{x^2}{2} + 3x - \frac{1}{2}$; $(-4, -1)$

14) $y = -x^4 + 2x^2 - 3$; $(-\infty, 1)$

15) $f(x) = -x^3 + 4x^2 - 6$; $[1, 3]$

16) $f(x) = x^3 - x^2 - 2$; $[2, \infty)$

17) $f(x) = x^4 - 4x^2 - 1$; $(-1, 1)$

18) $f(x) = x^3 - 3x^2 + 6$; $[0, 2]$

19) $y = -x^4 + x^2 - 1$; $(-\infty, \infty)$

20) $y = -\frac{x^2}{2} - 4x - 8$; $(-3, -1)$

Calculus Practice: Use Derivatives to Analyze Functions 12b

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

1) $y = -\frac{x^2}{2} - 3x - \frac{9}{2}$; $[-3, -1]$

Absolute minimum: $(-1, -2)$
Absolute maximum: $(-3, 0)$

2) $y = x^2 - 6x + 4$; $[0, 4]$

Absolute minimum: $(3, -5)$
Absolute maximum: $(0, 4)$

3) $y = -x^3 + 7x^2 - 16x + 8$; $[1, 3]$

Absolute minima: $(3, -4)$, $(2, -4)$
Absolute maximum: $(1, -2)$

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

Absolute minimum: $(0, 2)$
Absolute maximum: $(1, 3)$

5) $y = -x^4 + 4x^2 + 2$; $[-1, 1]$

Absolute minimum: $(0, 2)$
Absolute maxima: $(-1, 5)$, $(1, 5)$

6) $f(x) = x^4 - 3x^2 + 4$; $(-1, 1)$

No absolute minima.
Absolute maximum: $(0, 4)$

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

Absolute minima: $(1, -1)$, $(0, -1)$
Absolute maxima: $\left(-\frac{\sqrt{2}}{2}, -\frac{3}{4}\right)$, $\left(\frac{\sqrt{2}}{2}, -\frac{3}{4}\right)$

8) $f(x) = x^4 - 3x^2 - 3$; $[0, \infty)$

Absolute minimum: $\left(\frac{\sqrt{6}}{2}, -\frac{21}{4}\right)$
No absolute maxima.

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

Absolute minimum: $(-1, -4)$
No absolute maxima.

10) $y = x^2 - 2x - 1$; $[1, \infty)$

Absolute minimum: $(1, -2)$
No absolute maxima.

11) $f(x) = 2x^2 - 4x - 4$; $[-1, 2)$

Absolute minimum: $(1, -6)$
Absolute maximum: $(-1, 2)$

12) $y = x^4 - 2x^2 + 2$; $(-1, 1)$

No absolute minima.
Absolute maximum: $(0, 2)$

13) $y = \frac{x^2}{2} + 3x - \frac{1}{2}$; $(-4, -1)$

Absolute minimum: $(-3, -5)$
No absolute maxima.

14) $y = -x^4 + 2x^2 - 3$; $(-\infty, 1)$

No absolute minima.
Absolute maximum: $(-1, -2)$

15) $f(x) = -x^3 + 4x^2 - 6$; $[1, 3]$

Absolute minimum: $(1, -3)$
Absolute maximum: $\left(\frac{8}{3}, \frac{94}{27}\right)$

16) $f(x) = x^3 - x^2 - 2$; $[2, \infty)$

Absolute minimum: $(2, 2)$
No absolute maxima.

17) $f(x) = x^4 - 4x^2 - 1$; $(-1, 1)$

No absolute minima.
Absolute maximum: $(0, -1)$

18) $f(x) = x^3 - 3x^2 + 6$; $[0, 2]$

Absolute minimum: $(2, 2)$
Absolute maximum: $(0, 6)$

19) $y = -x^4 + x^2 - 1$; $(-\infty, \infty)$

No absolute minima.
Absolute maxima: $\left(-\frac{\sqrt{2}}{2}, -\frac{3}{4}\right), \left(\frac{\sqrt{2}}{2}, -\frac{3}{4}\right)$

20) $y = -\frac{x^2}{2} - 4x - 8$; $(-3, -1)$

No absolute minima.
No absolute maxima.