SATPREP

Assignment : Properties of curve

For each problem, find the x-coordinates of all critical points and find the open intervals where the function is increasing and decreasing.

1) $y = -x^2 + 8x - 17$

2) $y = -\dfrac{2}{x+2}$

3) $y = -x^3 + x^2 - 3$

4) $y = -(5x - 20)^{\frac{2}{3}}$

For each problem, find the open intervals where the function is concave up and concave down.

5) $y = \dfrac{2}{x+2}$

6) $y = -x^2 + 4x - 1$

7) $y = \dfrac{1}{4}(x-1)^{\frac{8}{3}} - 4(x-1)^{\frac{2}{3}} - 1$

8) $y = \dfrac{1}{6}(x+2)^{\frac{7}{3}} - \dfrac{14}{3}(x+2)^{\frac{1}{3}} + 1$

For each problem, find all points of relative minima and maxima.

9) $y = -(-7x + 21)^{\frac{2}{3}}$

10) $y = -x^2 + 8x - 10$

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

11) $y = x^2 + 6x + 3; \quad [-5, -1]$

12) $y = 2x^2 + 4x - 4; \quad [-2, 0]$

Answers to Assignment : Properties of curve

1) Critical point at: $x = 4$
   Increasing: $(-\infty, 4)$ Decreasing: $(4, \infty)$
2) No critical points exist.
   Increasing: $(-\infty, -2), (-2, \infty)$ Decreasing: No intervals exist.
3) Critical points at: $x = 0, \frac{2}{3}$
   Increasing: $\left(0, \frac{2}{3}\right)$ Decreasing: $(-\infty, 0), \left(\frac{2}{3}, \infty\right)$
4) Critical point at: $x = 4$
   Increasing: $(-\infty, 4)$ Decreasing: $(4, \infty)$
5) Concave up: $(-2, \infty)$ Concave down: $(-\infty, -2)$
6) Concave up: No intervals exist. Concave down: $(-\infty, \infty)$
7) Concave up: $(-\infty, 1), (1, \infty)$ Concave down: No intervals exist.
8) Concave up: $(-2, \infty)$ Concave down: $(-\infty, -2)$
9) No relative minima.
   Relative maximum: $(3, 0)$
10) No relative minima.
    Relative maximum: $(4, 6)$
11) Absolute minimum: $(-3, -6)$
    Absolute maxima: $(-5, -2), (-1, -2)$
12) Absolute minimum: $(-1, -6)$
    Absolute maxima: $(-2, -4), (0, -4)$