

Applications of 1st and 2nd Derivative HW KEY

I. Answers

1. y-intercept: $(0, 32)$; x-intercepts: $(-4, 0), (-8, 0)$
2. y-intercept: $(0, 0)$; x-intercepts: $(0, 0), (7, 0), (5, 0)$
3. y-intercept: $(0, 15)$; x-intercepts: $\left(-\frac{5}{2}, 0\right), \left(-\frac{3}{2}, 0\right)$
4. y-intercept: $(0, 36)$; x-intercepts: $(3, 0), (-3, 0), (2, 0), (-2, 0)$

II. Answers

5. $x = 1$
6. $x = \frac{1}{12}, 0$
7. $x = \pm 2$
8. $x = 0, 0.43, -1.18$

III. Answers

9. Inc: $(-\infty, 3.5)$; Dec: $(3.5, \infty)$; Max: $x = 3.5$
10. Inc: $(-\infty, 0) \cup (8, \infty)$; Dec: $(0, 8)$; Max: $x = 0$; Min: $x = 8$
11. Inc: $(5, \infty)$; Dec: $(-\infty, 5)$; Min: $x = 5$
12. Inc: $(-2, -1) \cup (1, \infty)$; Dec: $(-\infty, -2) \cup (-1, 1)$; Max: $x = -1$; Mins: $x = -2, 1$
13. Inc: $(-\infty, -2) \cup (-1, \infty)$; Dec: $(-2, -1)$; Max: $x = -2$; Min: $x = -1$
14. Inc: $(-\infty, -1.22) \cup (0, 1.22)$ Dec: $(-1.22, 0) \cup (1.22, \infty)$; Max: $x = \pm 1.22$; Min: $x = 0$
15. $x = 2, \frac{1}{2}$ are critical points. $x = 2$ is neither. $x = \frac{1}{2}$ is a local minimum.

IV. Answers

16. Positive: $(0, 1) \cup (3, 5)$; Negative: $(1, 3) \cup (5, 6)$
17. Inc: $(0, 2) \cup (4, 6)$; Dec: $(2, 4)$
18. $f(2)$ is a local max. $f(4)$ is a local min.

IV. (part 2) Answers

19. Concave up: $(-\infty, -1.73) \cup (0, 1.73)$; Concave down: $(-1.73, 0) \cup (1.73, \infty)$; POI: $x = -1.73, 0, 1.73$
20. Concave up: $(-\infty, -2) \cup (0, \infty)$; Concave down: $(-2, 0)$; POI: $x = -2, 0$
21. Concave up: $(1, \infty)$; Concave down: $(-\infty, 1)$; POI: $x = 1$
22. Concave up: $(-\infty, -1.15) \cup (1.15, \infty)$; Concave down: $(-1.15, 1.15)$; POI: $x = \pm 1.15$
23. C
24. $\frac{7}{\sqrt{5}}$
25. $\left(\frac{1}{2}, 2\right)$
26. $(0, 1)$