Math 121 – Section 2.3 Solutions

11. f is increasing on the interval $(-8, -2)$

13. f is not increasing on the interval $(2, 10)$ (it is decreasing on the interval $(2, 5)$)

15. f is increasing on the intervals: $(-8, -2)$, $(0, 2)$, $(5, \infty)$

17. There is a local maximum at $x = 2$ and the function value there is $f(-2) = 10$.

19. f has local maxima at the points $(-2, 6)$ and $(2, 10)$.

34. The function $f(x) = 2x^4 - x^2$ is even because:

$$f(-x) = 2(-x)^4 - (-x)^2 = 2x^4 - x^2 = f(x)$$

36. The function $h(x) = 3x^3 + 5$ is neither odd nor even because:

$$h(-x) = 3(-x)^3 + 5 = -3x^3 + 5 \neq h(x), -h(x)$$

38. The function $G(x) = \sqrt{x}$ is neither odd nor even since $G(-x)$ is not defined (the domain of $G(x)$ is $x \geq 0$).

42. The function $h(x) = \dfrac{x}{x^2 - 1}$ is odd because:

$$h(-x) = \frac{-x}{(-x)^2 - 1} = -\frac{x}{x^2 - 1} = -h(x)$$

45. The function $f(x) = x^3 - 3x + 2$ has a local maximum at $(-1, 4)$ and a local minimum at $(1, 0)$. The function is increasing on the intervals $(-2, -1)$ and $(1, 2)$. It is decreasing on the interval $(-1, 1)$.

53. The average rate of change of $f(x) = -2x^2 + 4$ is:

(a) From 0 to 2: $\dfrac{\Delta y}{\Delta x} = \dfrac{f(2) - f(0)}{2 - 0} = \dfrac{-4 - 4}{2} = -4$

(b) From 1 to 3: $\dfrac{\Delta y}{\Delta x} = \dfrac{f(3) - f(1)}{3 - 1} = \dfrac{-14 - 2}{2} = -8$

(c) From 1 to 4: $\dfrac{\Delta y}{\Delta x} = \dfrac{f(4) - f(1)}{4 - 1} = \dfrac{-28 - 2}{3} = -10$