Math 121 – Section 4.1 Solutions

11. $f(x) = 4x + x^3$ is a polynomial function of degree 3

13. $g(x) = \dfrac{1 - x^2}{2}$ is a polynomial function of degree 2

17. $g(x) = x^{3/2} - x^2 + 2$ is not a polynomial function since the first term has an exponent that is not a nonnegative integer

24. The graph of $f(x) = (x - 2)^5$ is the graph of $y = x^5$ shifted 2 units to the right.

30. The graph of $f(x) = -x^4$ is the graph of $y = x^4$ reflected across the x-axis.

38. If $f(x)$ has degree 3 and its zeros are -2, 2, and 3 then one possible function $f(x)$ is:

$$f(x) = (x + 2)(x - 2)(x - 3)$$

40. If $f(x)$ has degree 3 and its zeros are -4, 0, and 2 then one possible function $f(x)$ is:

$$f(x) = (x + 4)(x - 0)(x - 2)$$

43. If $f(x)$ has degree 3 and its zeros are -1 (multiplicity 1) and 3 (multiplicity 2), then one possible function $f(x)$ is:

$$f(x) = (x + 1)(x - 3)^2$$

53. $f(x) = 3(x^2 + 8)(x^2 + 9)^2$

    (a) $f(x)$ has no real zeros
    (b) there are no x-intercepts
    (c) there are no x-intercepts
    (d) $f(x)$ has degree 6 $\Rightarrow$ there are a maximum of 5 turning points
    (e) for large $|x|$, the function resembles $f(x) = 3x^6$

61. the possible functions are (c), (e), and (f)

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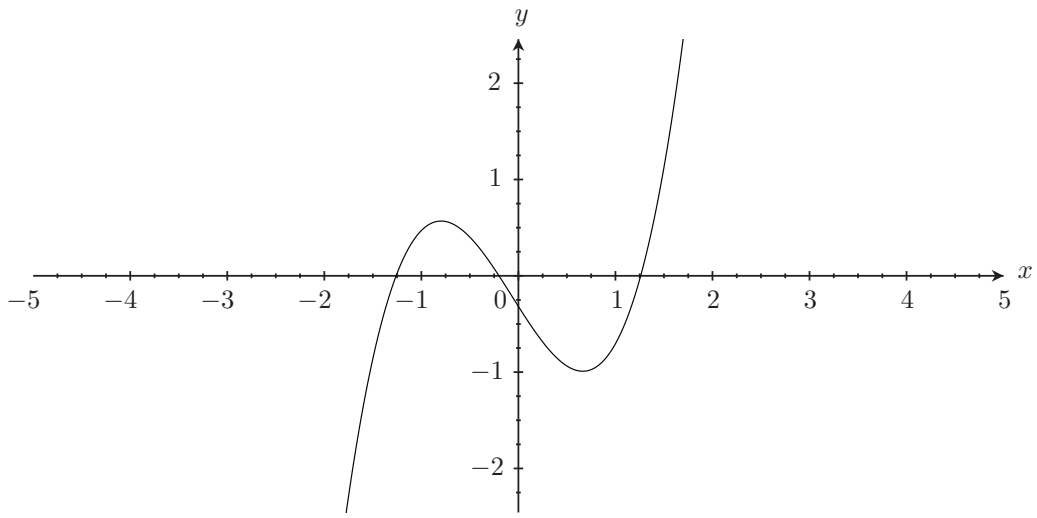
89. $f(x) = x^3 + 0.2x^2 - 1.5876x - 0.31752$

    (a) the degree is 3; the function resembles $f(x) = x^3$ for large $|x|$



(b)

(c) x intercepts: $x = -1.26,\ -0.2,\ 1.26$; y-intercepts: $y = -0.32$

(d) the graph is below the x-axis on the intervals: $(-\infty, -1.26)$ and $(-0.2, 1.26)$; the graph is above the y-axis on the intervals: $(-1.26, -0.2)$ and $(1.26, \infty)$

(e) local maximum: $(-0.80, 0.57)$; local minimum: $(0.66, -0.99)$

(f) see part (b)

(g) the domain and range are all real numbers

(h) f is increasing on the intervals: $(-\infty, -0.80)$, $(0.66, \infty)$; f is decreasing on the interval: $(-0.80, 0.66)$