4.5 Sketching Curves

(*These problems are taken from the Nelson Text: Pg. 212 – 213*)

2. How many local maximum and local minimum values are possible for a polynomial function of degree three, four, or n? Explain.

3. Determine whether each function has vertical asymptotes. If it does, state the equations of the asymptotes.

   a. $y = \dfrac{x}{x^2 + 4x + 3}$ b. $y = \dfrac{5x - 4}{x^2 - 6x + 12}$ c. $y = \dfrac{3x + 2}{x^2 - 6x + 9}$

4. Use the algorithm for curve sketching to sketch the following:

   a. $y = x^3 - 9x^2 + 15x + 30$

   b. $f(x) = -4x^3 + 18x^2 + 3$

   c. $y = 3 + \dfrac{1}{(x + 2)^2}$

   d. $f(x) = x^4 - 4x^3 - 8x^2 + 48x$

   e. $y = \dfrac{2x}{x^2 - 25}$

   f. $f(x) = \dfrac{1}{x^2 - 4x}$

   g. $y = \dfrac{6x^2 - 2}{x^3}$

   h. $f(x) = \dfrac{x + 3}{x^2 - 4}$

   i. $y = \dfrac{x^2 - 3x + 6}{x - 1}$

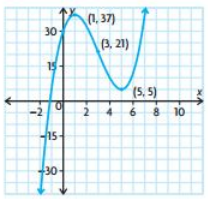
   j. $f(x) = (x - 4)^{\frac{2}{3}}$

6. Determine the constants a, b, c, and d so that the curve defined by $y = ax^3 + bx^2 + cx + d$ has a local maximum at the point $(2, 4)$ and a point of inflection at the origin. Sketch the curve.

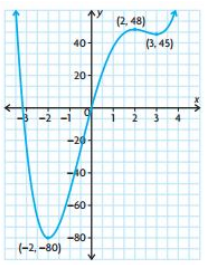
Answers to selected problems:

3. **a.** $x = -3$ or $x = -1$
b. no vertical asymptotes
c. $x = 3$

4. **a.**



d.



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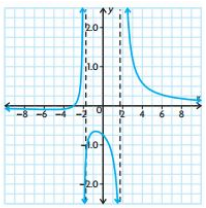

6. $a = -\dfrac{1}{4}, b = 0, c = 3, d = 0$