B) Degree 3 with 5, 1/3, and 2/3 as zeros

\[ x = 5 \quad x = \frac{1}{3} \quad x = \frac{2}{3} \]

\[ (x - 5)(x - \frac{1}{3})(x - \frac{2}{3}) \]

\[ (x - 5) \left( x^2 - \frac{x}{3} + \frac{2}{9} \right) \]

\[ (x - 5) \left( x^2 - x + \frac{10}{9} \right) \]

\[ \frac{x^3 - x^2 + \frac{5}{3}x}{-5x^2 - 5x - \frac{10}{9}} \]

\[ x^3 - 6x^2 - \frac{45}{9}x - \frac{10}{9} \]

Write a polynomial function of minimum degree in factored form with real coefficients whose zeros and their multiplicities include those listed. Then sketch a graph and discuss what you notice.

a) 3 (multiplicity 2), -4 (multiplicity 3)

\[ f(x) = (x - 3)^2 (x + 4)^3 \]

b) 3 (multiplicity 3), -4 (multiplicity 1)

\[ f(x) = (x - 3)^3 (x + 4) \]

\[ V_{-infty} \approx 6.9 \times 10^8 \]

1 (multiplicity 2), -2 (multiplicity 3)

\[ f(x) = (x - 1)^2 (x + 2)^3 \]
\[(x+1)(x+1)(x+1)(x-3)\]
\[\downarrow\]
\[(x^2+2x+1)(x^2-2x-3)\]
\[x^4 - 2x^3 - 3x^2\]
\[\quad - 4x^2 - 6x\]
\[\quad + x^2 - 2x\]
\[\quad - 3\]
\[\overline{x^4 - 6x^2 - 8x - 3}\]

-1 (multiplicity 3), 3 (multiplicity 1) (Also write in Standard Form) \((x+1)^3\) (x-3)
\[ \begin{array}{c}
6512 \\
\div 5 \\
32541 \\
\underline{-30} \\
25 \\
\underline{-25} \\
25 \\
\underline{-25} \\
6 \\
\underline{-5} \\
11 \\
10 \\
0
\end{array} \]

6512 \div 5