Quiz 11

Consider the function \( f(x) = x^4 - 3x^3 + x^2 + 3x - 2 \).

1. (2 points) Find all the potential real zeros.
   
   \[
   \frac{\text{Factors of } 2}{\text{Factors of } 1} = \frac{\pm 1, \pm 2}{\pm 1} = \pm 1, \pm 2
   \]

2. (4 points) Find all the actual zeros.
   
   \[
   \begin{array}{c|cccc}
   & 1 & -3 & 1 & 3 & -2 \\
   \hline
   1 & -2 & -1 & 2 & \\
   \hline
   & 1 & -2 & -1 & 2 \\
   \end{array}
   \quad \rightarrow \quad
   \begin{array}{c|cccc}
   & -1 & 1 & -2 & -1 & 2 \\
   \hline
   -1 & 3 & -2 & \\
   \hline
   & -1 & 3 & 2 & 0 \\
   \end{array}
   
   \downarrow
   
   x^2 - 3x + 2 = (x - 2)(x - 1)
   
   So \( f(x) = (x - 1)(x + 1)(x - 2)(x - 1) \)
   
   \( = (x - 1)^2(x + 1)(x - 2) \)

   Zeros are \( 1, -1, 2 \)

3. (1 points) What are the \( x \)-intercept(s)?
   
   \( x = 1, -1, 2 \)

4. (1 points) What is the \( y \)-intercept?
   
   \( y = -2 \)

5. (2 points) Use all the above information that you found to graph \( f(x) \). Note: what you found above does not give any info on the height of \( f(x) \) between the \( x \)-intercept(s).

\[\text{deg 4} \quad a_4 > 0 \quad \& \quad \text{odd}\]

\[
\begin{array}{c}
\text{deg 4} \\
a_4 > 0 \\
& \text{odd}
\end{array}
\]

\[
\begin{array}{c}
\text{deg 4} \\
a_4 > 0 \\
& \text{odd}
\end{array}
\]