\[ x^3 - 5x^2 + 17x - 13 = 0 \]

a) All possible rational roots:
Using the "Rational Roots Theorem," all possible rational roots will include factors of \(-13\) in the numerator and factors of 1 in the denominator:

\[ \frac{-13}{1}, \frac{13}{1}, \frac{-1}{1}, \frac{1}{1} \] so the possibilities are \[ \pm 1, \pm 13 \]

b) Try 1 as a root:

\[ \begin{array}{c|cccc}
\text{1} & 1 & -5 & 17 & -13 \\
\hline 
& 1 & -1 & 13 & 0 \\
\end{array} \]

\[ x = 1 \text{ is a root} \]

c) Try -13:

\[ \begin{array}{c|cccc}
-13 & 1 & -5 & 17 & -13 \\
\hline 
& -13 & 6 & -23 & 13 \\
\end{array} \]

\[ x = -13 \text{ is a root} \]

d) Try 13:

\[ \begin{array}{c|cccc}
13 & 1 & 5 & 17 & -13 \\
\hline 
& 13 & 10 & 194 & 121 \\
\end{array} \]

\[ x = 13 \text{ is not a root} \]

e) \( x = 1 \) is a root (found in part b), and the related reduced polynomial is:

\[ x^2 - 4x + 13 = 0 \]

\[ x = \frac{-(-4) \pm \sqrt{(-4)^2 - 4(1)(13)}}{2} = \frac{4 \pm \sqrt{16 - 52}}{2} = \frac{4 \pm \sqrt{-36}}{2} \]

\[ x = \frac{4 \pm 6i}{2} = 2 \pm 3i \]

Solution set is:
\[ \{ 1, 2 + 3i, 2 - 3i \} \]
3.3 (36) \[ x^4 - 3x^3 + 2x^2 - 4x - 8 = 0 \]

1. The possible rational roots (or zeros) are: \([-factors \text{ of } -8] / [factors \text{ of } 1]\)

2. Using a graphing utility, we can determine that \(x = -1\) and \(x = 2\) are zeros of the polynomial.

3. \[ \frac{1}{2} \frac{1}{2} \frac{3}{4} \] \(x = 2\) is a solution, and \(1 \ 1 \ 4 \ 4 \ 0 \rightarrow \) the quotient polynomial is: \(x^3 + x^2 + 4x + 4 = 0\)

4. Factor the quotient polynomial by grouping:

\[ x^3 + x^2 + 4x + 4 = 0 \]
\[ (x^2 + 4)(x + 1) = 0 \]
\[ (x + 2)(x + 2)(x + 1) = 0 \rightarrow \begin{cases} x + 2 = 0, \text{ or } x = -2; \\ x + 2 = 0, \text{ or } x = -2; \\ x + 1 = 0, \text{ or } x = -1 \end{cases} \]

So, the zeros (or solutions, or roots) are: \([-2, -2, 1, 2]\)

5. \(f(x) = -x^6 + 12x^3 - 58x^2 + 132x\)

Where \(x\) is hours after drug is given.

And \(f(x)\) is the concentration of the drug in the blood.

We need to find \(x\) when \(f(x) = 0\). There will be 4 roots.

By Descartes' rule, there are 3 sign changes, so there will be 3 or 1 positive real roots.

\[-x^6 + 12x^3 - 58x^2 + 132x = 0 \]
\[-x(x^5 - 12x^2 + 58x - 132) = 0 \rightarrow \text{ } x = 0 \text{ is a root, but it is not the one we're looking for.} \]

Using a graphing utility, it appears there is a root near \(x = 6\).

\[6 \ 1 \ -12 \ 54 \ -132 \]
\[-6 \ -36 \ 132 \]
\[1 \ -6 \ 22 \ 0 \rightarrow x = 6 \text{ is a root.} \]

We check the quotient polynomial's roots (they are not real), so \(x = 6\), meaning the drug is out of the bloodstream 6 hours after the dose is given.