Instructions. Do all problems, and show appropriate work. Do not use a calculator.

1. Use the Rational Zero Theorem to list all possible rational zeros for
   \[ P(x) = 5x^4 + 3x^3 - x^2 + 7x - 9 \]. (Do not try to find the zeros)
   \[ \pm \frac{1}{5}, \pm 1, \pm 3, \pm 9 \]
   Ani: \[ \pm 1, \pm 3, \pm 9, \pm \frac{1}{5}, \pm \frac{2}{5}, \pm \frac{9}{5} \]

2. Use Descartes’ Rule of Signs to determine the number of positive real zeros and the number of negative real zeros of \[ P(x) = 5x^4 + 3x^3 - x^2 + 7x - 9 \]. (Do not try to find the zeros)
   \[ P(x) \text{ has } 3 \text{ or } 1 \text{ positive real zero} \]
   \[ P(-x) \text{ has } 1 \text{ negative real zero} \]

3. Find all zeros of \[ P(x) = 4x^3 + 3x^2 + x + 3 \] given that \(-3\) is a zero for \( P(x) \).
   \[
   \begin{array}{c|cccc}
   -3 & 4 & 3 & 1 & 3 \\
   \hline
   0 & 0 & 0 & 0 & 0 \\
   \end{array}
   \]
   \[ x^2 + 1 = 0 \Rightarrow x = \pm i \]
   \[ P(x) \text{ has zeros } -3, i, -i \]