1. (3 points) Let $R$ be the region bounded by the $x$-axis and the graph of $y = \ln x$ on the interval $[2, 3]$. Set up, but do not evaluate, the definite integral which represents the volume of the solid obtained when $r$ is revolved around the line $x = 1$. Use proper notation.

2. (3 points) Set up, but do not evaluate, the definite integral which represents the volume of the solid obtained by rotating the region bounded by the curves $y = 4 - x^2$ and the $x$-axis about the $x$-axis.
3. (2 points) Precisely state Rolle’s Theorem.

4. (2 points) Explain carefully why \( f(x) = x^5 + 5x^3 + 3x - 10 \) cannot have two real roots.