1. Suppose that the universe of discourse is the set of integers. Using a direct proof, prove that, if $k+n$ is even and $n+m$ is even then $k+m$ is even.
2. Using proof by contradiction, prove that, if *n* is an integer where $n^{3}+5$ is odd, then *n* is even.
3. Suppose that the universe of discourse is the set of real numbers. A real number is rational if it is equal to the ratio of two integers. Let $R(x)$ be defined to mean “*x* is a rational number.” Prove $∃x∃y(¬R\left(x\right) ˄ ¬R\left(y\right) ˄ R\left(xy\right))$.