Homework I

1. [6+12=18 points]
   (a) provide the repeating decimal expansion for the rational number \( \frac{6}{7} \), and show how you arrived at your answer.

   (b) Provide the fraction in reduced form whose decimal expansion is .23434… = .\overline{234}, and show how you arrived at your answer.

2. [10 points]
   Show that \( \forall (P \land Q) \) is logically equivalent to \( \forall P \land \forall Q \); that is \( \forall (P \land Q) \iff (\forall P \land \forall Q) \) is True for all truth values of \( P \) and \( Q \).

3. [12 points]
   Problem #9, page 70 of text.

4. [15 points]
   Problem #3, page 132 of text.

5. [20 points]
   Prove by induction that the sum of the first \( n \) squares, \( 1^2 + 2^2 + \ldots + n^2 \), is \( \frac{n(n+1)(2n+1)}{6} \).

   That is in summation notation, \( \sum_{k=0}^{n} k^2 = \frac{n(n+1)(2n+1)}{6} \).