Assignment 4

This assignment is due by the end of lectures on Friday 3 February 2017.

1. Consider the following argument:
   “If you are a bird then you can sing. If you take singing lessons then you can sing. Therefore, if you take singing lessons then you are a bird.”

Let

\[ p = \text{“you are a bird”}, \]
\[ q = \text{“you take singing lessons”}, \text{ and} \]
\[ r = \text{“you can sing”}. \]

(a) [1 marks] Write down the above argument symbolically as a single compound proposition.

(b) [2 marks] Construct a truth table for the compound proposition you wrote down in part (a).

(c) [1 mark] Is the above argument is valid? Explain why.

2. [4 marks] Prove

\[ 1^2 + 2^2 + \ldots + n^2 = \frac{n(n + 1)(2n + 1)}{6} \]

for all \( n \geq 0 \) using mathematical induction.