

IB HL MATHEMATICS ASSIGNMENT

INVESTIGATING SERIES AND MATHEMATICAL INDUCTION

*Please answer all questions showing full working and detailed explanations.
Tables and diagram may be helpful to see the patterns.*

Question 1

The sequence of numbers is defined by $u_1 = 1 \times 1!$, $u_2 = 2 \times 2!$, $u_3 = 3 \times 3!$, ...
Find the n th term of the sequence.

Question 2

Consider the sum $S_n = u_1 + u_2 + \dots + u_n$.
Investigate S_n for different values of n .

Question 3

- (a) Conjecture an expression for S_n .
- (b) Verify that your conjecture works for the values of n investigated in Question 2.

Question 4

Use mathematical induction to prove your conjecture.