Chapter 1, 3, and 4 IB Style Review Questions

Sequences and Series

{M2007TZ1P1Q14}

An infinite geometric series is given by $\sum_{k=1}^{\infty} 2(4-3x)^k$.

(a) Find the values of x for which the series has a finite sum.

(b) When $x = 1.2$, find the minimum number of terms needed to give a sum which is greater than 1.328.

Counting Principles (Combinations and Permutations)

{M2006TZ0P1Q19}

There are 10 seats in a row in a waiting room. There are six people in the room.

(a) In how many different ways can they be seated?

(b) In the group of six people, there are three sisters who must sit next to each other. In how many different ways can the group be seated?

Binmonial Theorem

{N2005TZ0P2Q4}

[Maximum mark: 10]

(a) Write down the term in x^r in the expansion of $(x+h)^n$, where $0 \leq r \leq n$, $n \in \mathbb{Z}^+$. *[1 mark]*

(b) Hence differentiate x^n, $n \in \mathbb{Z}^+$, from first principles. *[5 marks]*

(c) Starting from the result $x^n \times x^{-n} = 1$, deduce the derivative of x^{-n}, $n \in \mathbb{Z}^+$. *[4 marks]*

Math Induction

{N2006TZ0P2Q1B}

Part B *[Maximum mark: 11]*

(a) Use mathematical induction to prove that

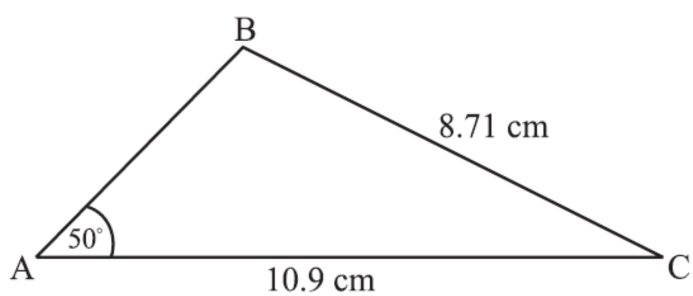
$$(1)(1!)+(2)(2!)+(3)(3!)+\ldots+(n)(n!)=(n+1)!-1 \text{ where } n\in\mathbb{Z}^{+}.$$ *[8 marks]*

(b) Find the minimum number of terms of the series for the sum to exceed 10^9. *[3 marks]*

Trig

In the **obtuse-angled** triangle ABC, $\mathrm{AC}=10.9\text{ cm}$, $\mathrm{BC}=8.71\text{ cm}$ and $\mathrm{B\hat{A}C}=50^{\circ}$.

Not to scale



Find the area of triangle ABC.

Roots of Polynomial Functions

4. *[Maximum mark: 6]*

The roots of a quadratic equation $2x^2+4x-1=0$ are α and β.

Without solving the equation,

(a) find the value of $\alpha^2+\beta^2$; *[4]*

(b) find a quadratic equation with roots α^2 and β^2. *[2]*