1. (a) Simplify the difference of binomial coefficients

$$\binom{n}{3}-\binom{2n}{2}, \text{ where } n \geq 3.$$

(4)

(b) Hence, solve the inequality

$$\binom{n}{3}-\binom{2n}{2} > 32n, \text{ where } n \geq 3.$$

(2)
(Total 6 marks)

2. Expand and simplify $\left(x^2-\frac{2}{x}\right)^4$.

(Total 4 marks)

3. When $\left(1+\frac{x}{2}\right)^n, n \in \mathbb{N}$, is expanded in ascending powers of x, the coefficient of x^3 is 70.

(a) Find the value of n.

(5)

(b) Hence, find the coefficient of x^2.

(1)
(Total 6 marks)

4. Determine the first three terms in the expansion of $(1-2x)^5(1+x)^7$ in ascending powers of x.

(Total 5 marks)

5. (a) Write down the quadratic expression $2x^2 + x - 3$ as the product of two linear factors.

(1)

(b) Hence, or otherwise, find the coefficient of x in the expansion of $(2x^2 + x - 3)^8$.

(4)
(Total 5 marks)