Additional Mathematics

Weekly Examination 1

Time Allowed: 1 Hour

Instructions to Candidates:

- Answer ALL questions.
- All working must be shown clearly.
- Calculators are permitted.

Total Marks: 70

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Question 1

1. Find the values of k and n given that $(1+kx)^n = 1 + 48x + 1008x^2 + \cdots$ [10]
2. Given that $10x$ is the second term in the expansion of $(1+2x)^n$, find the value of n [10]
3. Find the coefficient of x^5 in the expansion of $(2-x)^{12}$ [10]
4. Use Pascal's triangle to expand $\left(\frac{1}{2} - 2x\right)^5$ [10]
5. Find the term independent of x in the expansion of $\left(x^2 + \dfrac{1}{x}\right)^{12}$ [10]
6. Find the 8th term in the expansion of $(3+x)^{12}$ [10]

Question 2

1. Solve the following inequalities: [15]
   (a) $x^2 - 5x + 6 < 0$ [5]
   (b) $|2x - 1| < 5$ [5]
   (c) $(x-6)^2 \geq x$ [5]
2. Solve the inequality $\dfrac{3x+1}{x+4} > 1$ [10]

Question 3

1. The function f is defined as $f(x) = 2 + \sqrt{x-3}$ for $x \geq 3$ and $g(x) = \frac{1}{x} + 2$ for $x > 0$. Find $g(f(x))$ [10]