

Questions

1. Given that $z_1 = 5 - 3i$ and $z_2 = 2 + i$. Express $\frac{z_1^2}{z_1 - z_2}$ in the form of $a + bi$, where a and b are real numbers
2. Simplify
 - a) $9\sqrt{2} - 2\sqrt{18} + \sqrt{8}$
 - b) $3^{-n} \times 6^{3n} \div 12^n$
3. Solve $\frac{3^{5x+2}}{9^{1-x}} = \frac{27^{4+3x}}{729}$
4. Solve the inequalities $x - 1 < x^2 - 3 \leq 2x + 5$
5. a) Show that the $(r + 1)^{th}$ term of binomial expansion $\left(x^2 + \frac{1}{x}\right)^{10}$ can be written as $T_{r+1} = \binom{10}{r} x^{20-3r}$. Hence, find the coefficient of x^2
 - b) Expand $(1 - 2x)^{-3}$ in ascending powers of x up to the term in x^3 and state the range of x such that the expansion is valid. Hence, approximate $(0.9)^{-3}$

Final Answers:

1. $\frac{168}{25} - \frac{26}{25}i$
2. a) 6^n b) $5\sqrt{2}$
3. $x = -3$
4. $[-2, -1) \cup (2, 4]$
5. a) 210
 - b) $1 + 6x + 24x^2 + 80x^3 + \dots, |x| < \frac{1}{2}, 1.37$

