

STEP III, 1998, Q12

- 12 The mountain villages A, B, C and D lie at the vertices of a tetrahedron, and each pair of villages is joined by a road. After a snowfall the probability that any road is blocked is p , and is independent of the conditions of any other road. The probability that, after a snowfall, it is possible to travel from any village to any other village by some route is P . Show that

$$P = 1 - p^2(6p^3 - 12p^2 + 3p + 4).$$



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