

STEP II, 2006, Q12

- 12** A cricket team has only three bowlers, Arthur, Betty and Cuba, each of whom bowls 30 balls in any match. Past performance reveals that, on average, Arthur takes one wicket for every 36 balls bowled, Betty takes one wicket for every 25 balls bowled, and Cuba takes one wicket for every 41 balls bowled.
- (i) In one match, the team took exactly one wicket, but the name of the bowler was not recorded. Using a binomial model, find the probability that Arthur was the bowler.
- (ii) Show that the average number of wickets taken by the team in a match is approximately 3. Give with brief justification a suitable model for the number of wickets taken by the team in a match and show that the probability of the team taking at least five wickets in a given match is approximately $\frac{1}{5}$.
[You may use the approximation $e^3 = 20$.]



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