 Binomial probability problems

Part A – questions

1. The probability that it rains on any particular day during the 30 days of November is 0.1. Calculate the probability that it rains on fewer than 3 days in November.
2. A manufacturer makes light globes that have a probability of 0⋅05 of being defective. Quality control officers test random samples of 6 light globes each hour and reject the light globes made in that hour if at least 2 light globes are defective. Find the probability that the light globes made in any hour will be rejected. Answer to 2 significant figures.
3. A student sits for a multiple choice test with 10 questions. Each question has four alternatives. The student guesses all the answers.
4. Use the notation to indicate the details of the binomial distribution under consideration.
5. Find the probability that no questions are answered correctly
6. Find the probability that exactly 5 questions are answered correctly
7. Find the probability that 8 or more questions are answered correctly
8. The probability of a plant having a fungal infection is 30%.
9. What is the probability that 50% of the 20 plants tested have the characteristic?
10. What is the probability that 2 of the plants tested have the characteristic?
11. What is the probability that fewer than 5 of the plants tested have the characteristic?

Part A – worked solutions

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Part B – mean and variance of a binomial distribution

1. It is known that 18% of all the items produced from a factory are defective.
2. What is the expected number of items to be drawn to get a non-defective item? What is the variance in this situation?
3. Calculate the expected number of items to be drawn to get a defective item? What is the variance in this situation?
4. A student guesses all 20 questions in a multiple choice test which has 5 choices for each questions.
5. What is the expected number of questions the student will get correct?
6. What is the variance in the number of questions the student gets correct?
7. The incidence rate of lung cancer diagnosis for the adult population in Australia is approximately 42 per 100 000.
8. 14.5% of the adult population smoke. What is the expected number of people who smoke in a sample of 10 000 people?
9. What is the expected number of people that will be diagnosed with lung cancer this year? What is the variance?
10. 80% of new lung cancer diagnoses are from smokers. What is the expected number of people who smoke that will be diagnosed with lung cancer this year?
11. What is the expected incidence rate for smokers and non-smokers? (per 100 000)

Part B – worked solutions

1. It is known that 18% of all the items produced from a factory are defective.
2. What is the expected number of items to be drawn to get a non-defective item? What is the variance in this situation?

 (to get one non-defective item)

Variance:

1. Calculate the expected number of items to be drawn to get a defective item? What is the variance in this situation?

Solution:

 (to get one defective item)

Variance:

1. A student guesses all 20 questions in a multiple choice test which has 5 choices for each questions.
2. What is the expected number of questions the student will get correct?

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