

Solomon Practice Paper

Statistics S2 – C

Time allowed: 90 minutes

Centre: www.CasperYC.club

Name:

Teacher:

Question	Points	Score
1	6	
2	9	
3	10	
4	10	
5	13	
6	13	
7	14	
Total:	75	

How I can achieve better:

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1. (a) Explain briefly what you understand by the terms [2]

i. population,

ii. sample.
- (b) Giving a reason for each of your answers, state whether you would use a census or a sample [4]

survey to investigate

i. the dietary requirements of people attending a 4-day residential course,

ii. the lifetime of a particular type of battery.

Total: 6



2. The manager of a supermarket receives an average of 6 complaints per day from customers.

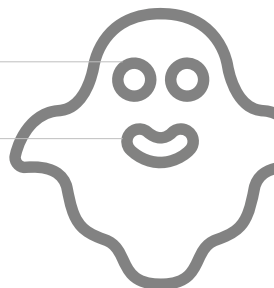
Find the probability that on one day she receives

- (a) 3 complaints, [3]
- (b) 10 or more complaints. [2]

The supermarket is open on six days each week.

- (c) Find the probability that the manager receives 10 or more complaints on no more than one day in a week. [4]

Total: 9



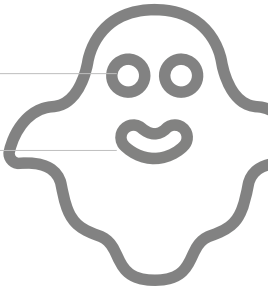
3. The sales staff at an insurance company make house calls to prospective clients. Past records show that 30% of the people visited will take out a new policy with the company. On a particular day, one salesperson visits 8 people. Find the probability that, of these,
- (a) exactly 2 take out new policies, [3]
 - (b) more than 4 take out new policies. [2]
- The company awards a bonus to any salesperson who sells more than 50 policies in a month.
- (c) Using a suitable approximation, find the probability that a salesperson gets a bonus in a month in which he visits 150 prospective clients. [5]

Total: 10



4. A rugby player scores an average of 0.4 tries per match in which he plays.
- (a) Find the probability that he scores 2 or more tries in a match. The team’s coach moves the player to a different position in the team believing he will then score more frequently. In the next five matches he scores 6 tries. [5]
- (b) Stating your hypotheses clearly, test at the 5% level of significance whether or not there is evidence of an increase in the number of tries the player scores per match as a result of playing in a different position. [5]

Total: 10

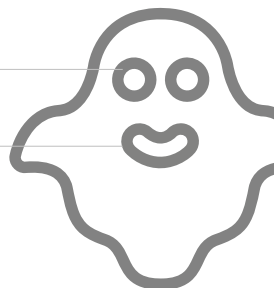


5. The continuous random variable X has the following cumulative distribution function:

$$F(x) = \begin{cases} 0, & x < 0, \\ \frac{1}{423}x^2(x^2 - 16x + 72), & 0 \leq x \leq 6, \\ 1, & x > 6. \end{cases}$$

- Find $\Pr(X < 2)$. [2]
- Find and specify fully the probability density function $f(x)$ of X . [4]
- Show that the mode of X is 2. [6]
- State, with a reason, whether the median of X is higher or lower than the mode of X . [1]

Total: 13



6. A shop receives weekly deliveries of 120 eggs from a local farm.

The proportion of eggs received from the farm that are broken is 0.008.

- (a) Explain why it is reasonable to use the binomial distribution to model the number of eggs that are broken in each delivery. [3]
- (b) Use the binomial distribution to calculate the probability that at most one egg in a delivery will be broken. [4]
- (c) State the conditions under which the binomial distribution can be approximated by the Poisson distribution. [1]
- (d) Using the Poisson approximation to the binomial, find the probability that at most one egg in a delivery will be broken. Comment on your answer. [5]

Total: 13



7. The random variable X follows a continuous uniform distribution over the interval $[2, 11]$.
 - (a) Write down the mean of X . [1]
 - (b) Find $\Pr(X \geq 8.6)$. [2]
 - (c) Find $\Pr(|X - 5| < 2)$. [2]

The random variable Y follows a continuous uniform distribution over the interval $[a, b]$.

- (d) Show by integration that [5]

$$E(Y^2) = \frac{1}{3} (b^2 + ab + a^2).$$

- (e) Hence, prove that [4]

$$\text{Var}(Y) = \frac{1}{12}(b - a)^2.$$

You may assume that $E(Y) = \frac{1}{2}(a + b)$.

Total: 14

