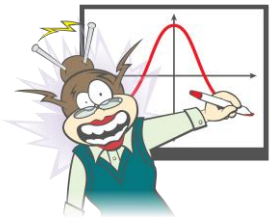

Mathematical Methods with TI-Nspire™ CX CAS

Exam-Style Questions

Part 3: Probability

Webinar questions and student revision questions

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Each of the questions included here can be solved using the TI-Nspire CX technology.

Question 1

The weights, W kg, of salmon at a salmon farm can be modelled by a normal distribution with mean 3.1 kg and standard deviation 0.4 kg.

(a) Find the probability that a randomly selected salmon from the farm will weigh less than 2.5 kg. Give your answer correct to four decimal places.

(b) According to this model, 99% of salmon at the farm weigh more than w kg. Find the value of w. Give your answer correct to one decimal place.

Response:

Question 2

Kathryn qualified to compete in a javelin throwing competition. In training for the competition, the distances X metres thrown by Kathryn were found to be normally distributed with mean 59.5 and standard deviation 3.

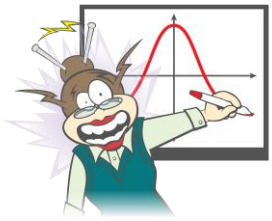
(a) Find $\Pr(59.5 \le X \le 63)$. Give your answer correct to four decimal places.

(b) Find $\Pr(X \ge 63 \mid X \ge 59.5)$. Give your answer correct to four decimal places.

In the competition, Kathryn has five throws.

(c) Use Kathryn's training model to find the probability that at least two of her throws will be at least 63 metres. Give your answer correct to four decimal places.

Response:



Question 3

The probability of a target shooter hitting the bullseye on any one shot is 0.2. Find the least number of shots the shooter should make to ensure a probability of more than 0.95 of hitting the bullseye at least once.

Response:

Question 4

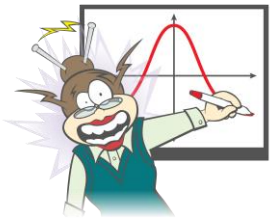
Given that $X \sim \mathrm{Bi}(10, 0.28)$ and $\Pr(X \leq k) = 0.9658$, correct to four decimal places, find the value of k.

Response:

Question 5

Consider $X \sim \mathrm{N}(\mu, \sigma^2)$. Given that $\Pr(X < 30) = 0.4$ and $\Pr(X < 55) = 0.9$, find the value of μ and of σ.
Give your answers correct to one decimal place.

Response:



Question 6

A biased coin is tossed five times. The probability of obtaining a tail in any one throw is p.
Let X be the number of tails obtained.

(a) Find, in terms of p, an expression for $\Pr(X = 3)$.

(b) (i) Determine the value of p for which $\Pr(X = 3)$ is a maximum.

(ii) For this value of p, determine the expected number of tails.

Response:

Question 7

If X is a binomial random variable with $n = 12$ and $\mathrm{E}(X) = 7.2$, then $\mathrm{var}(X)$ is equal to

A 1.70 B 2.68 C 2.88 D 4.80 E 8.29

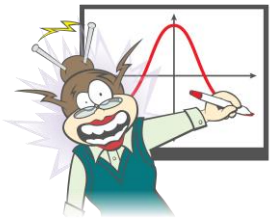
Response:

Question 8

The weights of bags of sugar are normally distributed with a mean of 1005 grams and a standard deviation of 5 grams. The percentage of bags that contain between 1002 grams and 1010 grams is closest to

A 13% B 43% C 52% D 57% E 61%

Response:



Question 9

Each member of a group of 100 students tosses a fair coin 200 times and records the number of tails obtained. Given that $\Pr(\mu - 2\sigma \le X \le \mu + 2\sigma) \approx 0.95$, which one of the following statements best describes the results expected from the group of students?

A Approximately 5 of the students could be expected to obtain more than 114 tails.
B Most students should obtain exactly 100 tails.
C Approximately 5 of the students could be expected to obtain less than 86 tails.
D Approximately 5 of the students could be expected to obtain less than 93 tails or more than 107 tails.
E Approximately 5 of the students could be expected to obtain less than 86 tails or more than 114 tails.

Response:

Answers

1 (a) 0.0668 (b) 2.2 kg

2 (a) 0.3783 (b) 0.2433 (c) 0.1152

3 14

4 5

5 $\mu = 34.1$ and $\sigma = 16.3$

6 (a) $10p^3(1-p)^2$ (b) (i) $\frac{3}{5}$ (ii) 3

7 C

8 D

9 E