Past test Questions for Test 7

Non-calc

Question 4 cont.

(b) Determine the cumulative distribution function (CDF) for $1 \leq t \leq 3$.

Question 5 **[3 marks: 2, 1]**

A political party is keen to know the proportion of voters in Australia who support a policy. A census is not possible. A far more efficient approach would be to sample voters and then form a reliable estimate for the proportion p.

(a) List two things that you can do to make the policy support proportion estimate more reliable.

(b) What statistical effect are you trying to reduce?

Greenwood College
Year 12 Maths Methods
Test 6 2018
Resource-Allowed

Name.....

Formula sheet, one A4 page double-sided of notes and calculators allowed.
30 mark total.
35 minute time limit

Normal distribution Z-score = (X – mean) ÷ (standard deviation)
where X is a random variable from a non-standard normal distribution.

Question 5 **[4 marks]**

John has completed a random survey to estimate a population proportion. With a confidence level of 99%, the interval estimate for the population proportion was found to be between 0.45 and 0.75. Determine the size of the sample he surveyed.

Question 5 **[13 marks: 2, 2, 1, 3, 2, 3]**

Surveys have show that 31% of the Australians went on an overseas trip during the year.

(a) Determine the standard deviation of proportion p. Assume 100 were surveyed.

(b) Determine a 95% confidence interval for the proportion of the Australian population that had taken an overseas trip.

(c) Assume the 31% sample proportion applies to the whole population.

A sample of 350 was taken and X = the number of people who took and overseas trip in 2012 was recorded. Give a range, using the 95% confidence interval, within which you would expect X to lie.

Question 5 cont.

(d) Determine the probability that in a random sample of 150 people, the number who had taken an overseas trip was greater than 50

(e) If 25 surveys were taken and for each a 95% confidence interval for p was calculated, determine the probability that at least 10 of the intervals included the true value of p.

(f) A follow-up survey is to be conducted to confirm the results of the original survey. Working with a confidence interval of 95%, estimate the sample size necessary to ensure a margin of error at most 5%.

Question 7 **[6 marks: 2, 2, 2]**

The Education Deparmentt of WA is keen to know the proportion of students who are not visual learners. A census can be done but it would be labour and time intensive, and costly to interview every public student in the state. A far more efficient approach would be to sample students from across the state and from this sample, form a reliable estimate for the proportion p.

(a) List two things that will make the non-visual learner proportion estimate more reliable.

(b) In statistical terms, student samples must be unbiased. What is the other aspect to consider?

(c) Stratified sampling is the best sampling method in terms of bias reduction. State what could wrong with this method

Question 8 **[4 marks]**

An initial survey found a proportion confidence interval of $0.649 \leq p \leq 0.725$.

A second survey is conducted and it found a confidence interval of $0.319 \leq p \leq 0.502$. Comment on the conduct of the second survey.

Question 9 [10 marks: 2, 1, 2, 2, 3]
Surveys have show that 31% of the Australians went on an overseas trip during the year.
(a) Determine a 95% confidence interval for the proportion of the Australian population that had taken an overseas trip.

(b) Assume the 31% sample proportion applies to the whole population.
A sample of 350 was taken and X = the number of people who took and overseas trip in 2012 was recorded. Give a range, using the 95% confidence interval, within which you would expect X to lie.

(c) Determine the probability that in a random sample of 150 people, the number who had taken an overseas trip was greater than 50

(d) If 25 surveys were taken and for each a 95% confidence interval for p was calculated, determine the probability that at least 10 of the intervals included the true value of p.

(e) A follow-up survey is to be conducted to confirm the results of the original survey. Working with a confidence interval of 95%, estimate the sample size necessary to ensure a margin of error at most 5%.

Question 10 **[4 marks: 2, 1, 1]**

The Education Deparmentt of WA is keen to know the proportion of students who are not visual learners. A census can be done but it would be labour and time intensive, and costly to interview every public student in the state. A far more efficient approach would be to sample students from across the state and from this sample, form a reliable estimate for the proportion p.

(a) List two things that will make the non-visual learner proportion estimate more reliable.

(b) In statistical terms, student samples must be unbiased. What is the other aspect to consider?

(c) Stratified sampling is the best sampling method in terms of bias reduction. State what could wrong with this method

Question 11 **[2 marks]**

An initial survey found a proportion confidence interval of $0.649 \leq p \leq 0.725$.

A second survey is conducted and it found a confidence interval of $0.319 \leq p \leq 0.502$.

Comment on the conduct of the second survey.

Question 12 **[3 marks]**

Determine the confidence interval, as a %, given the following information.

$0.2 \leq p \leq 0.3$
Sample size = 40.

Question 12 **[3 marks]**

It is known that 3% of a batch of canned beef stew is contaminated with horse meat. A sample of n cans was randomly selected from this batch. Find the maximum value of n so that the probability that there is at least one contaminated can is no more than 50%.

Question 13 **[3 marks]**

X is a normal variable with a mean of 120 and a standard deviation of 20.

Find k if $P(115 \leq X \leq k) = 0.5$

Question 14 **[5 marks: 2, 3]**

Let the proportion of people in a city that are able to "roll their tongue" be p. A sample of 400 residents in this city yielded a confidence interval for p as $0.23 \leq p \leq 0.29$

(a) Explain why the proportion able to "roll their tongues" is 0.26.

(b) If 50 samples of 400 residents each were selected, and the associated confidence intervals for p calculated in the same manner. How many confidence intervals would actually contain p ?