

**Institute of Technology Tralee**

**Quality Management, Tools and Techniques in Practice**

**Statistics Assignment 3**

**Student: Bertie Harte**

**ID Number: T00209740**

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**Assignment 3**

**1. Question 1**

**Researchers studying anthropometry collected body girth measurements and skeletal diameter measurements, as well as age, weight, height and gender, for 507 physically active individuals.**

**The histogram below shows the sample distribution of heights in centimetres, and the table shows sample statistics calculated based on this sample.**

**Which of the following is not necessarily true?**



(a) The sample mean is 171.1 cm.

**(b) The population mean is 171.1 cm.**

(c) The sample median is 170.3 cm.

(d) The point estimate for the population mean is 171.1 cm.

**Answer:** **(b) The population mean is 171.1 cm.**

**2. Question 2**

**Researchers studying anthropometry collected various body and skeletal measurements for 507 physically active individuals. The histogram below shows the sample distribution of heights in centimetres. If the 507 individuals are a simple random sample - and let’s assume they are - then the sample mean is a point estimate for the mean height of all active individuals. What measure do we use to quantify the variability of such an estimate? Compute this quantity using the data from this sample and choose the best answer below.**

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(a) Standard error = 0.019

(b) Standard deviation = 0.019

**(c) Standard error = 0.417**

(d) Mean squared error = 0.105

(e) Standard deviation = 0.417

**Answer(s): (c) Standard error = 0.417**

**3. Question 3**

**Students are asked to count the number of chocolate chips in 22 cookies for a class activity. They found that the cookies on average had 14.77 chocolate chips with a standard deviation of 4.37 chocolate chips. After collecting the data, a student reports the standard error of the mean to be 0.93 chocolate chips. What is the best way to interpret the student’s result?**

**(a) 0.93 chocolate chips is a measure of the variability we’d expect in calculations of the mean number of chocolate chips if we took repeated random samples of 22 cookies**

(b) 0.93 is the standard deviation of the number of chocolate chips in a chocolate chip cookie.

(c) The student either made a calculation error or his result is meaningless, because it does not make sense to talk about 0.93 chocolate chips.

(d) 0.93 chocolate chips is a measure of the variability in the mean number of chocolate chips across all chocolate chip cookies.

**Answer: (a) 0.93 chocolate chips is a measure of the variability we’d expect in calculations of the mean number of chocolate chips if we took repeated random samples of 22 cookies**

**4. Question 4**

**Four plots are presented below. The plot at the top is a distribution for a population. The mean is 60 and the standard deviation is 18.**

**Also shown below is a distribution of**

**(1) a single random sample of 500 values from this population,**

**(2) a distribution of 500 sample means from random samples of each size 18,**

**(3) a distribution of 500 sample means from random samples of each size 81.**

**Determine which plot (A, B, or C) is which.**



(a) (1) one sample, n = 500 - Plot A

(2) 500 samples, n = 18 - Plot B

(3) 500 samples, n = 81 - Plot C

(b) (1) one sample, n = 500 - Plot B

(2) 500 samples, n = 18 - Plot C

(3) 500 samples, n = 81 - Plot A

(c) (1) one sample, n = 500 - Plot C

(2) 500 samples, n = 18 - Plot B

(3) 500 samples, n = 81 - Plot A

(d) (1) one sample, n = 500 - Plot C

(2) 500 samples, n = 18 - Plot A

(3) 500 samples, n = 81 - Plot B

(e) (1) one sample, n = 500 - Plot A

(2) 500 samples, n = 18 - Plot C

(3) 500 samples, n = 81 - Plot B

**Answer: (b) (1) one sample, n = 500 - Plot B**

**(2) 500 samples, n = 18 - Plot C**

**(3) 500 samples, n = 81 - Plot A**

**5. Question 5**

**We want to estimate the average coffee intake of IT Tralee students, measured in cups of coffee. A survey of 1,000 students yields an average of 0.55 cups per day, with a standard deviation of 1 cup per day. Which of the following is not necessarily true?**

(a) The sample distribution is right skewed.

(b) 0.55 is a point estimate for the population mean.

(c) μ=0.55, σ=1

(d) x¯=0.55, s=1

**Answer(s): (c) μ=0.55, σ=1**

**6. Question 6**

**All but one of the following confidence intervals has a margin of error of 0.7. Which is the confidence interval with the different margin of error?**

(a) (−4.7, −3.3)

(b) (20.3, 21.7)

(c) (−0.5, 0.9)

**(d) (1.6, 4.4)**

**Answer(s): D (1.6, 4.4)**

**7. Question 7**

**A company offering online speed reading courses claims that students who take their courses show a 5 times (500%) increase in the number of words they can read in a minute without losing comprehension. A random sample of 100 students yielded an average increase of 415% with a standard deviation of 220%. Calculate a 95% confidence interval for the average increase in number of words students can read in a minute without losing comprehension. Choose the closest answer.**

(a) (412.09, 417.91)

**(b) (371.88, 458.12)**

(c) (378.7, 451.3)

(d) (411.37, 418.63)

**Answer(s): (b) (371.88, 458.12)**