

Show all necessary work .[. You MUST show some process]

1 [do NOT use graphing calculator and write answer]

a) Find the mean of 7, 8, 9 {1 mark}

$$\frac{7+8+9}{3} = \frac{24}{3} = 8$$

b) Find the standard deviation of SAMPLE data 7, 8, 9 {2 marks}

$$8 - 7 = 1 \quad \text{squared} = 1 \quad \text{avg. of squares} = \text{total}/(n-1) = 2/2 = 1$$

$$8 - 8 = 0 \quad \text{squared} = 0$$

$$8 - 9 = -1 \quad \text{squared} = 1 \quad \text{standard deviation} = \text{square root of } (1) = 1$$

c) Find the standard deviation of POPULATION data 7, 8, 9 {2 marks}

$$8 - 7 = 1 \quad \text{squared} = 1 \quad \text{avg. of squares} = \text{total}/n = 2/3 = 0.66667$$

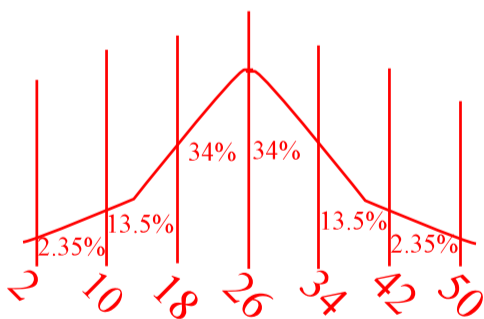
$$8 - 8 = 0 \quad \text{squared} = 0$$

$$8 - 9 = -1 \quad \text{squared} = 1 \quad \text{standard deviation} = \text{square root of } (0.66667) = 0.8$$

3. Use the following information to answer the questions that follow;

A population of 1000 workers in an office building was found to have an average of \$26.00 dollars in their pockets with a standard deviation of \$8.00

a) sketch an approximate frequency graph {1 mark}



b) approximately what percentage of people have between \$18.00 and \$34.00 {1 mark}

$$34\% + 34\% = 68\%$$

c) approximately what percentage of people have between \$10.00 and \$18.00 {1 mark}

$$13.5\%$$

d) approximately how many people in the office building have less than \$2.00. {2 marks}

99.7% between \$2 and \$50, so 0.3 % outside that.

$$0.3/2 = 0.15\%$$

$$0.15\% \times 1000 = 0.0015 \times 1000 = 1.5 \text{ or } 2 \text{ people}$$

4. For the following situation name the sampling method and explain if it is biased or not.

A server at an ice cream parlor rolls a dice whenever he serves someone. If he rolls a 3 he asks them the question “What is your favorite flavor?” {1 mark}

Simple random and unbiased

5a). A large number of samples of size 25 are taken from a population with a known mean of 242. What is an approximate value of the mean of the means of all the samples? {1 mark}

mean of sample means = population mean = 242

$$\mu_{\bar{x}} = \mu = 242$$

b) A large number of samples of size 25 are taken from a population with a known standard deviation of 10. What is an approximate value of the standard deviation of the means of all the samples? {1 mark}

Stan. dev. of sample means = population standard deviation / root of sample size = $10/\sqrt{25} = 10/5 = 2$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{10}{\sqrt{25}} = \frac{10}{5} = 2$$

6a) A sample from a population was asked “How many living relatives do you know?”. The population has a known standard deviation of 30. The mean number of living relatives is 56. If the sample size was 36, what is a 95% confidence interval? {3 marks}

95% → $z = 1.96$, $\bar{x} = 56$, $\sigma = 30$, $n = 36$

$$\begin{aligned} & \left(\bar{x} \pm z \frac{\sigma}{\sqrt{n}} \right) \\ & = \left(56 \pm 1.96 \frac{30}{\sqrt{36}} \right) = (56 \pm 1.96(5)) \\ & = (56 \pm 9.8) = (56 - 9.8, 56 + 9.8) \\ & = (46.2, 65.8) \end{aligned}$$

b) Explain this 95% confidence interval. {2 marks}

I am 95 % confident that the range of living relatives from 46.2 to 65.8 will capture the average number of living relatives of the population

7a) A population has an unknown mean and standard deviation. A sample of 64 is taken and is found to have a mean of 80 and a standard deviation of 24. Find the 90% confidence interval. {3 marks}

90% → $z = 1.645$, $\bar{x} = 80$, $S_x = 24$, $n = 64$

$$\begin{aligned} & \left(\bar{x} \pm z \frac{S_x}{\sqrt{n}} \right) \\ & = \left(80 \pm 1.645 \frac{24}{\sqrt{64}} \right) = (80 \pm 1.645(3)) \\ & = (80 \pm 4.9) = (80 - 4.9, 80 + 4.9) \\ & = (75.1, 84.9) \end{aligned}$$

b) for part “a”, is the mean of the sample a “point estimator” or “interval estimator”? Explain. {1 mark}

The mean in part “a” is a point estimator, because it is a one value.