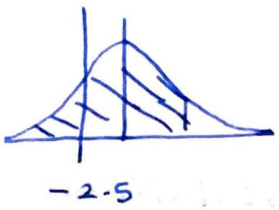
Central Limit Theorem Assignment.

1. $\mu_{pop} = 10$; $\sigma_{pop} = 4$ $\quad n = 100$

$$z = \frac{x - \mu_{samp}}{\sigma_{samp}} = \frac{9 - 10}{4/\sqrt{100}} = \frac{-1}{4} \times 10$$



$= (-2.5)_z = 0.00621$ //

2.

5. $\mu_{pop} = \mu_{samp} = 6.0$ inch.

$S.D_{pop} = 1.0$ inch

a) $z = \frac{x - \mu}{\sigma} = \frac{6.2 - 6.0}{1.0} = 0.2_z =$ ~~0.4207~~ //

$= 0.5793$ //

b) $z = \frac{x - \mu}{\sigma_{samp}} = \frac{6.2 - 6.0}{1/\sqrt{100}} = 2_z =$ ~~0.2275~~ //

$= 0.9772$ //

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14. $\mu_{pop} = \mu_{samp} = 28.3$; $n = 10$

$S.D_{pop} = 2.3$; $X = 27$

$$z = \frac{x - \mu}{\sigma/\sqrt{n}} = \frac{27 - 28.3}{2.3/\sqrt{10}} = \frac{-1.3}{0.727} = -1.788$$

$= 0.0375$ //

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13. $\mu_{pop} = 75$, $S.D_{pop} = 5$

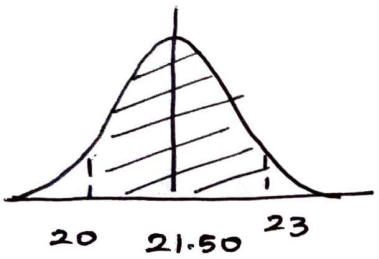
a) $x = 83$.

$$z = \frac{x-\mu}{\sigma} = \frac{83-75}{5} = 1.6 \Rightarrow 0.9452 //$$

b) $n = 5$

$$z = \frac{x-\mu}{\sigma/\sqrt{n}} = \frac{83-75}{5/\sqrt{5}} = 3.57 \Rightarrow 0.99 //$$

12.



$\mu = 21.50$ $\sigma = 2.22$

$n = 8$ $x_1 = 20$

$x_2 = 23$

① $\Rightarrow$ $\frac{x_1-\mu}{\sigma/\sqrt{n}} = \frac{20-21.50}{2.22/\sqrt{8}} = -1.91$

$= 0.0281 //$

② $\Rightarrow$ $\frac{x_2-\mu}{\sigma/\sqrt{n}} = \frac{23-21.50}{2.22/\sqrt{8}} = 1.91$

$= 0.9719 //$

Between 20 and 23 is;

$0.9719 - 0.0281 \Rightarrow 0.9438 //$

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11. $\mu_{POP} = 23.1$ years $\sigma_{pop} = 3.1$ years.

$n = 6$ $x = 27$ (greater).

$$z = \frac{27-23.1}{3.1/\sqrt{6}} = \frac{3.9}{1.265} = (3.08)_z \Rightarrow 0.9990$$

$\therefore$ greater than 27 years would be $1 - 0.9990$

$\Rightarrow 0.001 //$

10. $\mu = 4.0g$ $\quad n = 50$

$\sigma = 1.5g$ $\quad x_1 = 3.5$; $x_2 = 3.8g$.

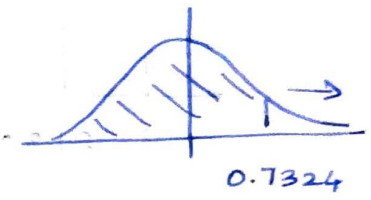
$$z_1 = \frac{3.5 - 4}{1.5/\sqrt{50}} = \frac{-0.5}{0.212} = -2.35 = 0.0094$$

$$z_2 = \frac{3.8 - 4}{1.5/\sqrt{50}} = \frac{-0.2}{0.212} = -0.94 = 0.1736$$

$\therefore$ Between 3.5 and 3.8 is; 0.1642 //

9. $\mu = 172$ pounds.

S.D = 29 pounds.



a) $X = 190$ pounds (greater)

$$z = \frac{190 - 172}{29} = (0.62)_z = 0.7324$$

Since greater; $1 - 0.7324 \Rightarrow 0.2676$ //

b) $n = 25$

$$\therefore z = \frac{190 - 172}{29/\sqrt{25}} = \frac{18}{5.8} = (3.10)_z = 0.9990$$

Since greater; $1 - 0.9990 \Rightarrow 0.001$ //

c) max allowed weight 4750 pounds. If 25 people $\Rightarrow \frac{4750}{25} \Rightarrow 190$. Hence we need to determine pbty for greater than 190 for 25 people; $\therefore$ 0.001 //

7. $\mu = 268$ days ; $\sigma = 15$ days $n = 25$ women.
less than 260 days.

$$\therefore z = \frac{260 - 268}{15/\sqrt{25}} = \frac{-8}{15/5} = (-2.66)_z = 0.0039$$

8. From the last answer, the probability value is very low 0.0039 which is less than 1%; hence the diet does have a special effect on the women. Since pbty of of event occuring normal is less than one percent.

6. From answer (5).

Answer (b) performs calculation on a sample and not population. Hence looking at the results. on the sample of 25 people. even though it says only 1 percent of people had size greater than 6.2 inch but the 25 does not represent the population only the sample. If we take population then 42 % of people have head size greater than 6.2 inch, hence wouldn't fit them.

4. $n = 35$ men $\quad x| > |98$

$\mu = 96 \quad \sigma = 16$

$$z = \frac{98 - 96}{16/\sqrt{35}} = \frac{2}{2.704} = (0.73)_z = 0.7673$$

greater than 98, hence $1 - 0.7673$

$\Rightarrow 0.2327 \Rightarrow 23\%$

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3. $\mu = 2.4 \quad \sigma = 2.0 \quad n = 100$

250 tickets 100 passengers.

$$X = \frac{250}{100} = 2.5 \quad \text{atleast}(2.5).$$

$$z = \frac{2.5 - 2.4}{2/\sqrt{100}} = \frac{0.1}{2/10} = 0.5$$

$= 0.6915$ // 69.15% will be able to purchase all the 250 tickets for the journey.

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2. $\mu = 50$kgs. $\sigma = 15 \quad n = 10$.

max lift capacity is 550 kgs, $\therefore 550/10 = 55$

$$\therefore z = \frac{55 - 50}{15/\sqrt{10}} = \frac{5}{15/3.162} = \frac{5}{4.74} = 1.05$$

$= 0.8531 \Rightarrow 85.31\%$