Israel N
Week 6 4/26/2020

1)

1000 students mean = 174.5 cm standard deviation = 6.9 cm

200 random samples of size 25 nearest 10th of centimeter

a) mean & standard distribution of the sampling distribution of $\bar{X}$

mean $\Rightarrow$ $\mu_{\bar{x}} = \mu_x = 174.5$

$$\sigma_{\bar{x}} = \frac{\sigma_x}{\sqrt{n}} = \frac{6.9}{\sqrt{25}} = \frac{6.9}{5} = \sigma_{\bar{x}} = 1.38$$

B) # of samples (means) fall between 172.5 & 175.8 cm inclusive.

*hint: compute Prob then multiply by # of samples, 200

$$P(172.5 < \bar{X} < 175.8) \Rightarrow z_1 = \frac{172.5 - \mu_{\bar{x}}}{\sigma_{\bar{x}}}$$

$$z_1 = \frac{172.5 - 174.5}{1.38} \Rightarrow -1.4$$

$$z_2 = \frac{175.8 - 174.5}{1.38} \Rightarrow 0.9$$

$P(172.5 < \bar{X} < 17.8) = P(-1.4 < z < 0.9)$

$\Rightarrow P(z < 0.9) - P(z < -1.4) \Rightarrow$ * Note From table A_3

$\Rightarrow (0.8159 - 0.0808) = 0.7351$

$200(0.7351) = 147.02$ $\Rightarrow$ Note from assigment means recorded to the nearest tenth place

$147.02 \approx 147$

2) drive thru driver

$\mu = 3.2$ standard dev. $\sigma = 1.6$

random sample 64 customers, Find probability that ther mean is.

a) at most 2.7 min

$$P(\bar{X} \leq 2.7) = P\left(\frac{\bar{X} - 3.2}{1.6/\sqrt{64}}\right) = \left(\frac{2.7 - 3.2}{1.6/8}\right)$$

$= -2.5 \Rightarrow \boxed{P(Z \leq -2.5) = 0.0062}$

B) more than 3.5 min

$$P(\bar{X} \geq 3.5) = P\left(\frac{\bar{X} - 3.2}{(1.6/8)}\right) = P\left(\frac{3.5 - 3.2}{(1.6)/8}\right) = 1.5$$

$$P(Z \geq 1.5) = 1 - P(Z \leq 1.5) = (1 - 0.9332) = \boxed{0.0668}$$

3) mean resistance = 40 ohms
σ = 2 ohms

random sample 36 resistors

What is the probability those 36 resistors combined resistance of more than 1458 ohms?

Hint: what will the average resistance be if the combined resistance is more than 1458 ohms?)

$\frac{1458}{36} \Rightarrow 40.5$

$\mu_{\bar{x}} = \mu = 40$

$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{36}} = \frac{2}{6} = \frac{1}{3}$

$P(40.5 < \bar{x}) = P\left(\frac{(40.5 - 40)}{(\frac{1}{3})}\right) = \frac{(.5)}{(1/3)} = 1.5$

$P(40.5 < \bar{x}) = 1 - P(1.5 \geq z) = 1 - (0.9332) = 0.0668$

$\boxed{P(40.5 < \bar{x}) = 0.0668}$

4) Batteries in e-games last average of 30 hrs.

16 batteries are tested each month

if computed t values falls between $-t_{0.025}$ & $t_{0.025}$

firm is happy!

Should the firm be happy if sample has mean 27.5 hrs & standard deviation of 5 hrs? Assume life expectancy is still the same

$n = 16$ batt $\mu = 30$ hrs

$s = 5$ hrs $\bar{x} = 27.5$ hrs

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$$T = \frac{\bar{X} - \mu}{S/\sqrt{n}} = \frac{27.5 - 30}{5/\sqrt{16}} = \frac{-2.5}{1.25} = -2$$

$T = -2$

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degrees of freedom $v = n - 1 \Rightarrow$ $v = 15$ degrees of freedom

* from Table A4

$-t_{0.025} = -2.131$

$t_{0.025} = 2.131$

*Therefore -2 falls within the range set by the firm & the firm is happy :)