* Solutions *

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term053-I
Quiz #6 Section: 1 2

Name: ID: Serial:

Question1. (1.5+2.5=4-Points)

A population is normally distributed, with a mean of 8 00 and a standard deviation of 150.Then:

a. What is the sampling distribution of the sample mean when selecting a random sample of size 5 from this population

$\bar{X}$ has a normal dist. with

mean $= \mu_{\bar{x}} = \mu = 800$

standard deviation $= \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{150}{\sqrt{5}} = 67.0820$ } (1.5) pts

b. Find the probability that a random sample of size 16 selected from this population will have a sample mean between 780 and 830.

$\bar{X} \sim N(800, \frac{150}{4} = 37.5)$

$P(780 < \bar{x} < 830) = P\left(\frac{780-800}{37.5} < \frac{\bar{x}-800}{37.5} < \frac{830-800}{37.5}\right)$ } (1)

$= P(-.53 \leq Z \leq 0.8) = 0.2019 + 0.2881$ } (1)

$= .49$ (.5)

Question2. (1+3+2=6-Points)

Given a population in which the probability of success is $p = 0.40$, if a sample of 800 is taken, and yields 360 success items, then:

a. Find the sampling error. $\bar{p} = \frac{360}{800} = 0.45$

Sampling error $= \bar{P} - P = 0.45 - .40 = .05$ } (1)

b. Find the probability that the proportion of success in the sample is less than 0.44.

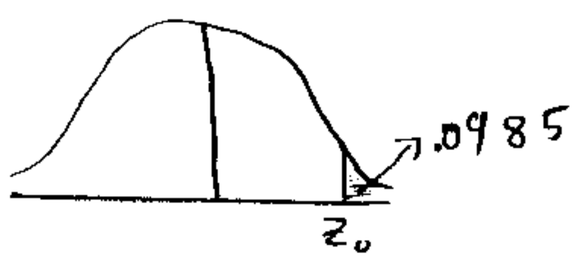
$\bar{P} \sim N(\mu_{\bar{P}} = .40, \sigma_{\bar{P}} = \sqrt{\frac{(.4)(1-.4)}{800}} = 0.0173)$ } (1)

$P(\bar{P} < .44) = P\left(\frac{\bar{P}-.40}{.0173} < \frac{.44-.40}{.0173}\right) = P(Z < 2.31)$ } (1)

$= 0.5000 + 0.4896$
$= 0.9896$ } (1)

c. If the $P(\bar{p} > p_0) = 0.0985$ find the value of p_0.

$P\left(\frac{\bar{P}-.40}{.0173} > \frac{P_0-.40}{.0173}\right) = .0985$ (1)



let $z_0 = \frac{P_0-.40}{.0173} \Rightarrow P(Z > z_0) = .0985$

$\Rightarrow P(0 < Z < z_0) = .5 - .0985 = .4015$ } (.5)

$\Rightarrow z_0 = 1.29 \Rightarrow \frac{P_0 - .40}{.0173} \approx \frac{1.29}{1}$

$P_0 - .40 = 0.0223 \rightarrow P_0 = .4223$ (.5)

Solutions

King Fahd University of Petroleum & Minerals
Department of Mathematical Science
STAT-211-Term053-II
Quiz #6 Section: 1 2

Name: ID: Serial:

Question1. (1.5+2.5=4-Points)

A population is normally distributed, with a mean of 750 and a standard deviation of 120.Then:

a. What is the sampling distribution of the sample mean when selecting a random sample of size 7 from this population

$\bar{X}$ has a normal dist. with (1.5) pts

$\text{Mean} = \mu_{\bar{x}} = \mu = 750$

$\text{Standard deviation} = \sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{120}{\sqrt{7}} = 45.3557$

b. Find the probability that a random sample of size 9 selected from this population will have a sample mean between 730 and 780.

$\bar{X} \sim N(750, \sigma = \frac{120}{3} = 40)$

$P(730 \le \bar{x} \le 780) = P\left(\frac{730-750}{40} \le \frac{\bar{x}-750}{40} \le \frac{780-750}{40}\right)$ } (1)

$= P(-.5 \le Z \le 0.75) = 0.1915 + 0.2734$ } (1)

$= 0.4649$ } (.5)

Question2. (1+3+2=6-Points)

Given a population in which the probability of success is $p = 0.35$, if a sample of 800 is taken, and yields 296 success items, then:

a. Find the sampling error. $\bar{P} = \frac{x}{n} = \frac{296}{800} = 0.37$ } (1)

$\text{Sampling Error} = \bar{P} - P = .37 - .35 = .02$

b. Find the probability that the proportion of success in the sample is more than 0.38.

$\bar{P} \sim N\left(M_{\bar{P}} = .35, \sigma_{\bar{P}} = \sqrt{\frac{(.35)(1-.35)}{800}} = 0.0169\right)$ } (1)

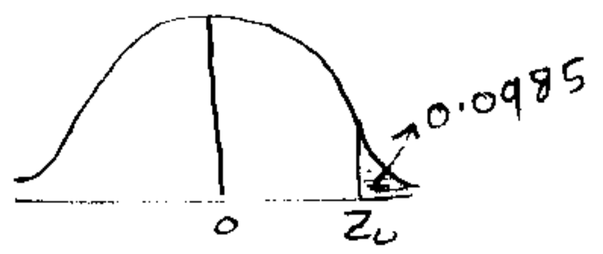
$P(\bar{P} > .38) = P\left(\frac{\bar{P}-.35}{.0169} > \frac{.38-.35}{.0169}\right) = P(Z > 1.78)$ } (1)

$= 0.5000 - 0.4625$

$= 0.0375$ } (1)

c. If the $P(\bar{p} > p_0) = 0.0985$ find the value of p_0.

$P\left(\frac{\bar{P}-.35}{.0169} > \frac{P_0-.35}{.0169}\right) = .0985$



} (1)

let $Z_0 = \frac{P_0-.35}{.0169} \Rightarrow P(Z > Z_0) = .0985$

$\Rightarrow P(0 < Z < Z_0) = .5 - .0985 = .4015$

$Z_0 = 1.29 \Rightarrow \frac{P_0-.35}{.0169} \Leftarrow \frac{1.29}{1}$ } (.5)

$P_0 - .35 = 0.0218 \Rightarrow P_0 = 0.3718$ } (.5)