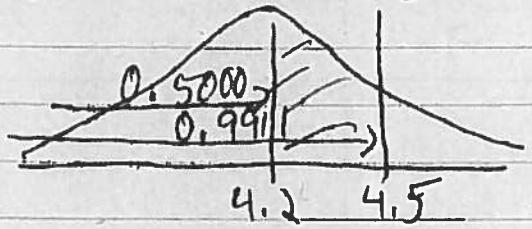
Chapter 9: Sampling Distribution Answer Key by Michael Reimer

1) a) $\mu = 4.2 \quad \sigma = 0.8 \quad n = 40$

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}} = \frac{0.8}{\sqrt{40}} = \frac{0.8}{6.32455532} = 0.12649106$$

Std

b) $P(4.2 < \bar{x} < 4.5)$

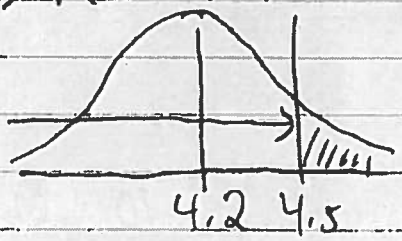


$$z = \frac{\bar{x} - \mu}{\frac{\sigma}{\sqrt{n}}} = \frac{4.2 - 4.2}{\frac{0.8}{\sqrt{40}}} = \frac{0}{0.12649106} = 0.00 = 0.5000$$

$$z = \frac{4.5 - 4.2}{0.12649106} = 2.37|1708245 = 2.37 = 0.9911$$

$0.9911 - 0.5000 = \underline{\underline{0.4911}}$

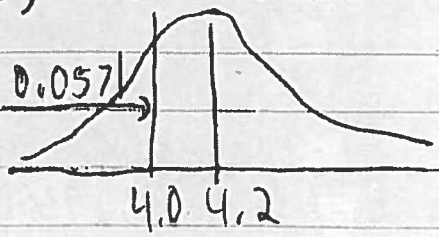
c) $P(\bar{x} > 4.5)$



$$z = \frac{4.5 - 4.2}{\frac{0.8}{\sqrt{40}}} = \frac{0.3}{0.12649106} = 2.37 = 0.9911$$

$1 - 0.9911 = \underline{\underline{0.0089}}$

d) $P(\bar{x} < 4)$



$$z = \frac{4.0 - 4.2}{\frac{0.8}{\sqrt{40}}} = \frac{-0.2}{0.12649106} = -1.58|13883 = -1.58 = 0.0571$$

$= \underline{\underline{0.0571}}$

e) $\mu = 4.2 \quad \sigma = 0.8 \quad n = 40 \quad N = 400$ the population is $\frac{400}{40} = 10$ times as large as the sample

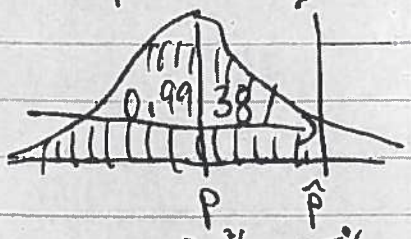
Use Finite Population Correction Factor because

$$\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}\sqrt{\frac{N-n}{N-1}} = \frac{0.8}{\sqrt{40}}\sqrt{\frac{400-40}{400-1}} = 0.12649106\sqrt{\frac{360}{399}} \Rightarrow$$

Chapter 9: Answer key by Michael Reiner

1) e) $0.12649106 \times \sqrt{0.90225639} = 0.12649106 \times 0.94981138 = 0.12015028$

2) $P(\hat{p} < 25\%)$ $\hat{p} = 25\% = 0.25$ $p = 20\% = 0.20$ $n = 400$



$\hat{p}$ = Sample Proportion

p = Population Proportion

$$z = \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} = \frac{0.25 - 0.20}{\sqrt{\frac{0.20(1-0.20)}{400}}} = \frac{0.05}{\sqrt{\frac{0.20(0.80)}{400}}} = \frac{0.05}{\sqrt{\frac{0.16}{400}}} = \frac{0.05}{\sqrt{0.0004}}$$

$$= \frac{0.05}{0.02} = 2.50 = 0.9938$$

3)

Group 1 Toronto	Group 2 Hamilton
$n_1 = 52$	$n_2 = 63$
$\mu_1 = 280$	$\mu_2 = 290$
$\sigma_1 = 30$	$\sigma_2 = 26$

$$z = \frac{(\bar{x}_1 - \bar{x}_2) - (\mu_1 - \mu_2)}{\sqrt{\frac{\sigma_1^2}{n_1} + \frac{\sigma_2^2}{n_2}}}$$

$$z = \frac{0 - (280 - 290)}{\sqrt{\frac{30^2}{52} + \frac{26^2}{63}}} = \frac{0 - (-10)}{\sqrt{\frac{900}{52} + \frac{676}{63}}}$$

$$z = \frac{-10}{\sqrt{17.30769231 + 10.73015873}} = \frac{-10}{\sqrt{28.03785104}} = \frac{10}{5.29507800} = 1.88854306 = 1.89 = 0.9706$$

$1 - 0.9706 = 0.0294$