①

$\frac{20}{\text{Quiz}} + \frac{10}{\text{Lab}} + \frac{20}{\text{WebCT}} + \frac{25}{\text{Mid}} + \frac{25}{\text{Final}}$ 11-21

P. 225

21. $\mu = 3.8$
$\sigma = 1.2$
$n = 36$

$P(3.7 < \bar{x} < 3.9) =$

$P\left(\frac{3.7-3.8}{1.2/\sqrt{36}} < z < \frac{3.9-3.8}{1.2/\sqrt{36}}\right) =$

$P(-.5 < z < .5) = 2(.1915)$
$= .3830$

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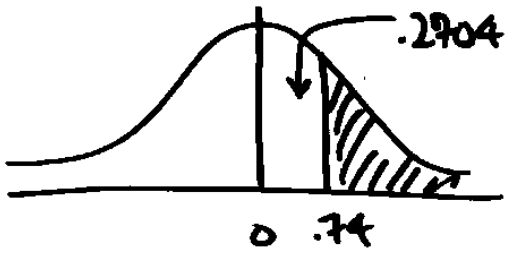
②

23. $p = .18$
$n = 200$

$P(\hat{p} \geq .2) = P\left(z \geq \frac{.2 - .18}{\sqrt{\frac{.18(.82)}{200}}}\right)$

$= P(z \geq .74) = .5 - .2704$

$= .2296$



(3)

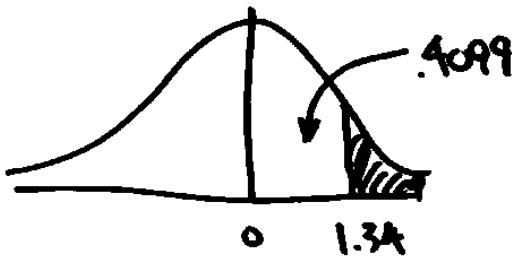
25. $\mu = 119600$

$\sigma = 35{,}000$

$n = 75$

$$P(\bar{x} > 125000) = P\left(z > \frac{125000 - 119600}{35000/\sqrt{75}}\right)$$

$$= P(z > 1.34) = .5 - .4099 = .0901$$



(4)

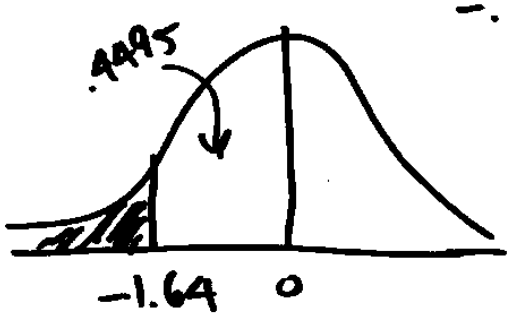
27. $p = \frac{1}{7}$

$n = 180$

$$P(\hat{p} < .1) = P\left(z < \frac{.1 - \frac{1}{7}}{\sqrt{\frac{\frac{1}{7} \cdot \frac{6}{7}}{180}}}\right)$$

$$= P(z < -1.64) = .5 - .4495$$

$$= .0505$$



Chapter 6

Suppose that the population mean, μ, is unknown.

Based on a random sample from the population,

① Estimate μ (point estimate)

② Give a margin of error (interval estimate)

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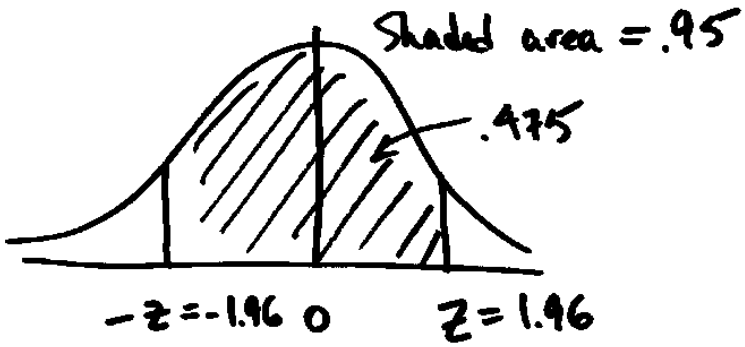
① To estimate μ, use $\bar{x}$



$P(-1.96 < z < 1.96) = .95$ True statement

$-1.96 < z < 1.96$ True 95% of the time

$$-1.96 < \frac{\bar{x}-\mu}{\sigma/\sqrt{n}} < 1.96$$

True 95% of the time

Multiply by $\sigma/\sqrt{n}$:

$$-1.96\frac{\sigma}{\sqrt{n}} < \bar{x}-\mu < 1.96\frac{\sigma}{\sqrt{n}}$$

Add $-\bar{x}$:

$$-\bar{x}-1.96\frac{\sigma}{\sqrt{n}} < -\mu < -\bar{x}+1.96\frac{\sigma}{\sqrt{n}}$$

Multiply by -1:

$$\bar{x}+1.96\frac{\sigma}{\sqrt{n}} > \mu > \bar{x}-1.96\frac{\sigma}{\sqrt{n}}$$

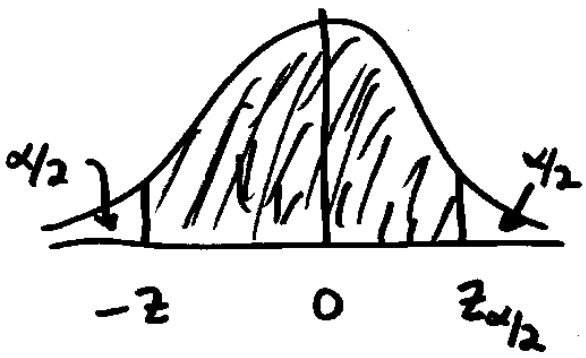
$$c > b > a \iff a < b < c$$

$$\bar{x}-1.96\frac{\sigma}{\sqrt{n}} < \mu < \bar{x}+1.96\frac{\sigma}{\sqrt{n}}$$

margin of error

True 95% of the time

$\bar{x} \pm 1.96 \frac{\sigma}{\sqrt{n}}$ is called a 95% confidence interval for the population mean, μ.



α = total tail area

Shaded area = $1 - \alpha$

↑ subscript is the upper tail area

If you want 95% confidence,

then $1 - \alpha = .95 \Rightarrow \alpha = .05$

$\Rightarrow \alpha/2 = .025$

Read the z value from the .025 column of the table, using the ∞ row.

90%: $1 - \alpha = .9 \Rightarrow \alpha = .1$

$\alpha/2 = .05$

In general: $\boxed{\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}}$

In a sample of 50 people, we find an average income of $42,000.

Past experience tells us that $\sigma = \$10,000$.

Find a 95% C.I. for μ.

$$\bar{x} \pm z_{\alpha/2} \frac{\sigma}{\sqrt{n}}$$

$$42000 \pm (1.96) \frac{10000}{\sqrt{50}}$$

$$\boxed{\$42000 \pm \$2771.86}$$

HW p. 251 # 5, 9

Lab 4 due Thursday 11/30

Quiz 5 on Thursday 11/30