~~#3~~
2:45

Final Exam

1. a) $\bar{x} = 80.6$ $s = 14.28$

60, 75, 82, 88, 98

median = 82

b) i) BB. players

ii) wts of 100 coins randomly sel. cash register

iii) hts. of trees @ CSUS

c) Both Empirical & Chebychev's apply.

d) $\mu = 30$, $\sigma = 7$

Empirical Rule says $\approx 95\%$ in

$\mu \pm 2\sigma = 30 \pm 2(7) = 30 \pm 14$ $\boxed{(16, 44)}$

Chebychev's says <u>at least</u> 75% in

$30 \pm 2(7)$

Empirical Rule more accurate

e) Chebychev's - yes

Empirical Rule - No

2:51 2. a) Diet 2 appears to be more effective since the middle ~~half~~ 50% of weight loss on Diet 2 exceeds the middle ~~half~~ 50% of wt. loss on diet 1.

b) $Q_1 \approx 3$

$m \approx 5$

$Q_3 \approx 7$ $IQR = Q_3 - Q_1 = 7 - 3 = 4$

c) an outlier is a data value far from the bulk of the data. Outliers are the small circles to the right of the boxplot.

d) diet type - qualitative

weight loss - quantitative cont.

3.06 3. a) i) positive ii) near zero iii) neg.

iv) neg. (assume more shoppers as the number of days until Christmas decreases)

b) $y = -2.1x + 27.4$

c) $y = -2.1(5) + 27.4 = 16.9$

d) -0.92

3.08

4. a) $P(X > 9) = P\left(Z > \frac{9-7.2}{1.1}\right) = P(Z > 1.64)$

$= 1 - 0.9495$

$= 0.0505$

b) 0.01

-2.33

① $Z = -2.33$

② $\frac{x - \mu}{\sigma} = -2.33$

$\frac{x - 7.2}{1.1} = -2.33$

$x = 7.2 - 1.1(2.33) = \boxed{4.637}$

c) $P(\overline{X} > 7.5) = P\left(Z > \frac{7.5 - 7.2}{1.1/\sqrt{100}}\right)$

$= P(Z > 2.73)$

$= 1 - .9968 = \cancel{0.00032}\ 0.0032$

d) i) solid

ii) ~~dashed~~ dotted (tallest peak)

3.16 iii) ~~dotted~~ dashed

5. 2 a) X is either \$200 or -\$149,800

3 b)

x	p(x)
200	0.9999
-149,800	0.0001

3 c) $EX = 200(.9999) + -149{,}800(.0001) = \$185$

$\quad 199.98 \qquad -14.98$

$\sigma^2 = \sum (x-\mu)^2 \cdot p(x) = (200-185)^2(.9999) + (-149{,}800-185)^2(.0001)$

$= 224.98 + 2249550.023 \qquad \sigma = 1499.9$

5d) 100,000 (185) = \$18,500,000

6. $X = \#$ of 20 infected $\qquad n=20,\ p=0.10$

a) $P(X \le 2) = 0.677$ (from table in text)

b) $P(X>2) = 1-P(X\le 2) = 1-.677 = 0.323$

c) $EX = np = 1000(.1) = 100$

$\sigma = \sqrt{npq} = \sqrt{100(.9)} = \sqrt{90} = 9.49$

3:47

7. 4 a) $\frac{81}{200} \pm 1.645\sqrt{\frac{\frac{81}{200}\cdot\frac{119}{200}}{200}}$

$0.405 \pm 1.645(0.0347)$

0.405 ± 0.057

$0.348 < p < 0.462$

1 b) No. 0.5 is not a plausible value for p

1 c) Incr. width

1 d) No. $n\hat{p} = \cancel{200(\frac{81}{200})}$ 3 < 5

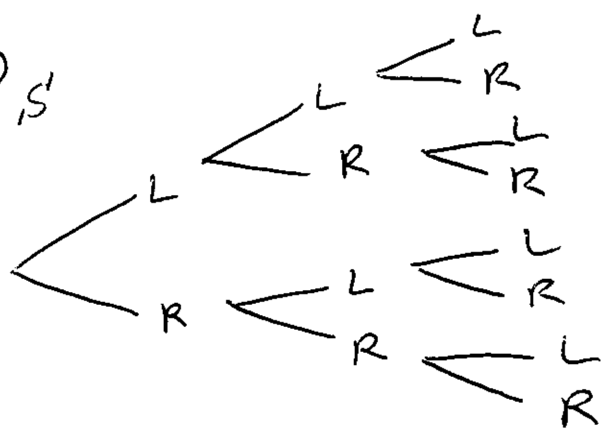
e). ~~Zα~~ width $= 2 z_{\alpha/2}\sqrt{\frac{\hat{p}\hat{q}}{2\cdot n}}$

decreases by 0.707

1 f) $z_{0.07} = 1.48$

3:54

5 8. a) 5



LLL
LLR
LRL
LRR → X=1
RLL
RLR → X=1
RRL → X=1
RRR

1 b) X=1 {LRR, RLR, RRL}

1 c) No.

3 d) $P(X=1) = 3(0.15)(0.85)^2 = 0.3251$

3:57

10. a) $\frac{40}{2260} - \frac{21}{2270} = 0.0177 - 0.00925$

b) $\hat{p}_1 - \hat{p}_2 \pm z_{\alpha/2} \sqrt{\frac{0.0177(1-0.0177)}{2260} + \frac{0.00925(1-0.00925)}{2270}}$

$0.00845 \pm 1.96 \sqrt{(7.693\times10^{-6} + 4.0372\times10^{-6}}$

$0.00845 \pm (0.0037) 1.96$ $\qquad$ 0.00845 ± 0.0074

$0.00475 < p_1 - p_2 < 0.012$ $\qquad$ $0.00105 < p_1 - p_2 <$

c) Since 0 is not in the interval, there appears to be a difference. Prempro appears to increase the chance of dementia

11. $H_0: \mu = 12$ oz
$H_a: \mu < 12$ oz

$z^* = \frac{11.4 - 12}{0.68/\sqrt{36}} = -5.29$

Rej region

rej Ho if $z^* < -1.645$

∴ Rej Ho

at the 0.05 l.o.s., we can conclude the root beers are underfilled on average

12 a) Type I : Rej Ho when Ho true
: Conclude driver is dead when driver is alive

Type II: Accept Ho when Ho false
Concludes driver is alive when driver is dead.

b) prefer $\alpha = 0.02$ & $\beta = 0.10$

13. a) WR $P(\text{all black}) = \left(\frac{15}{20}\right)^3 = 0.42$

b) WOR $\frac{15}{20}\left(\frac{14}{19}\right)\left(\frac{13}{18}\right) = \frac{2730}{6840} = 0.399$

c) $\frac{\cancel{5}}{\cancel{20}} \cdot \left(\frac{\cancel{4}}{19}\right)\left(\frac{\cancel{15}}{\cancel{18}}\right)\left(\frac{\cancel{14}}{17}\right)\left(\frac{13}{16}\right) \cdot \binom{5}{2} = \frac{27,300}{93024}$

(cancellations: 5, 7, 4, 3; $\binom{5}{2} = 10$)

$= 0.293$

9) $H_0: \mu = 200$

2 $H_a: \mu \neq 200$

$\alpha = 0.05$

4 $z^* = \frac{198-200}{12/\sqrt{36}} = \frac{-2}{12/6} = \frac{-2}{2} = -1.00$

2 Rej Region: Rej H_0 if $z^* < -1.96$, $z^* > 1.96$

Fail to Rej H_0.

2 At the 0.05 l.o.s., we cannot conclude the true mean aspirin content differs from 200 mg.

~~SA~~

Extra Credit:

$\overline{C1}$ = don't get contract 1

$C1$ = get contract 1

a) $(C1, C2)$ $\quad (\overline{C1}, C2)$ $\quad (C1, \overline{C2})$ $\quad (\overline{C1}, \overline{C2})$

$X = 80{,}000$ $\quad X = 50{,}000$ $\quad X = 30{,}000$ $\quad X = 0$

b)

X	p(x)
0	$.7(.4) = 0.28$
30,000	$0.3(.4) = .12$
50,000	$0.7(0.6) = 0.42$
80,000	$.3(.6) = .18$

$$EX = \left(3(.12) + 5(.4) + 8(.18)\right)10^4$$

$$= \cancel{1.44 \times 10^4} \quad 3.8 \times 10^4$$

$$= \cancel{14,400} \quad \$38{,}000$$