(12th Ed)
11th Ed.

MTH 256 Exam Review Fall 2010: ANSWERS (from Review at End of Each Chpt.

Chpt 1: 3, 4, 8, 23 (12th Ed: 3 4 8 23) (#3) & (#4) — see pg 18 charts. (#8) uses good random process; allows valid inferences to population

#23 (a) designed expt. (b) Smokers (c) quantitative (time) (d) pop'l: all US smokers. (e) inference to all US smokers

Chpt 2: 151, 168 (12th Ed: 159 176) (#151) outliers in data; skewness of pop'l or sample (#168) mean $= \frac{\sum x_i}{n}$; median $= \frac{1}{2}(14) = 7^{th}$ smallest value.

Chpt 3: 141, 144, 147, 150, 160, 176a (12th Ed: 155 156 1(6) 162 174 190a) (#141) $\cap$ like and; $\cup$ like or; $|$ means given that; ^{c} means compliment; opposite; not

(144) (a) $\sum_{all\ i} P(S_i) = 1$; $P(S_1) + P(S_4)$; (147) for questions asked, can consider die outcomes are even (E)

or odd (O) and coin outcomes are Head (H) or Tail (T); then sample pts are (E,E), (E,O), (O,H), (O,T), each

having $\frac{1}{2}\cdot\frac{1}{2} = \frac{1}{4}$ prob; $P(A) = \frac{1}{4}$ and $P(B) = P((O,H) \text{ or } (O,T)) = \frac{1}{4}+\frac{1}{4} = \frac{1}{2}$; $A^c = \{(E,E),(E,O),(O,T)\}$,

$B^c = \{(E,E),(E,O)\}$; $A \cap B = \{(O,H)\}$; $A \cup B = \{(O,H),(O,T)\}$; $P(A^c) = \frac{3}{4}$, $P(B^c) = \frac{1}{2}$, $P(A\cap B) = \frac{1}{4}$, $P(A\cup B) = \frac{1}{2}$

$P(A|B) = \frac{P(A\cap B)}{P(B)} = \frac{1/4}{1/2} = \frac{1}{2}$; $P(B|A) = \frac{P(A\cap B)}{P(A)} = \frac{1/4}{1/4} = 1$; A & B are not mutually excl. since $P(A|B) \neq 0$; not indpt because $P(A|B) \neq P(A)$

(150) (a) & similar to ideas in #144; answers are for (a): .567, for (b) .118 (160) (a) $2\cdot2\cdot2\cdot2\cdot2 = 2^5 = 32$

160 (b) $\frac{1}{32}$ (c) $5\cdot\left(\frac{1}{32}\right) = \frac{5}{32}$ (d) likely that pheromone has effect (176) a) P(Ace 1^{st} & Face 2^{nd}) + P(Face 1^{st} & Ace 2^{nd}) $= \frac{4}{52}\cdot\frac{12}{51} + \frac{12}{52}\cdot\frac{4}{51}$ (J,Q,K)

Chpt 4: Discrete: 107, 116a, 112 (12th Ed: 124) (116a) $\mu = E(x) = \sum_{all\ x}[x\,p(x)] = 15.4$; $\sigma^2 = E((x-\mu)^2) = \sum_{all\ x}[(x-\mu)^2 p(x)] = 18.44$; $\sigma = \sqrt{\sigma^2} = 4.294$

Chpt 5: 106 a,b,c, 119a (12th Ed: 112 a b c 127a) 106 (a) normal (b) Exponential (c) Normal (119) (a) use normal approx. $\mu = n\cdot p = (.08)1000 = 80$

$\sigma = \sqrt{np(1-p)} = 8.6$; so $P(X > 175) \approx P(\text{normal}(80, 8.6) > 175) = P\left(z > \frac{175-80}{8.6}\right) = 0$; (b) $P(x < 140) \approx P\left(z < \frac{140-80}{8.6}\right) = 1$

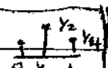
Chpt 6: 46, 49, 50, 56 (12th Ed: 48 50 52 58) #46 (simulate) repeat a sampling experiment a very large number of times & get resulting dist. of sample statistic.

#49 True; $\sigma_{\bar{x}} = \frac{\sigma}{\sqrt{n}}$. (#50) (a) it ↓ by a factor of $\frac{1}{\sqrt{n}}$ (b) poor est. (c) $\bar{x}$ is preferred because $\sqrt{n} > \sqrt[3]{n}$ (d) $\frac{\sigma}{\sqrt{n}} = 1.25$; CLT

#56

prob	Outcomes 1^{st} 2^{nd}	$\bar{x}$
$\frac{1}{2}\cdot\frac{1}{2}$	0 0	0
$\frac{1}{2}\cdot\frac{1}{2}$	0 1	$\frac{1}{2}$
$\frac{1}{2}\cdot\frac{1}{2}$	1 0	$\frac{1}{2}$
$\frac{1}{2}\cdot\frac{1}{2}$	1 1	1

$\bar{x}$: 0, 1/2, 1; 0+1/2 = 1/2; 1+1/2 = 1/2



Chpt 7: 84, 85, 88a (12th Ed: 110 111 114a) (84) we've used a procedure that would work 95% of time in long run

(85) a. use t b. use z: 1.96 (c) use z (d) use z; (e) neither.

(88) (a) $\bar{x} \pm z_{\frac{.01}{2}}\cdot\frac{s}{\sqrt{n}} \Rightarrow \bar{x} \pm 2.57\frac{s}{\sqrt{n}}$ n small; t-test, also assume normal pop'l

Chpt 8: 123, 124, 131, 135 (12th Ed: 129 130 137 141) (123) alternative (124) n large; z test, only assume good random sample

(131) Test stat $\frac{(n-1)s^2}{\sigma_0^2}$ H_0 χ^2 with 41-1 df.; value test stat $= \frac{(47.6)^{40}}{30} = (1.59)40 = 63.5$ for Part a, compare to $\chi^2_{.05} = 55.75$ reject H_0 | for Part b, compare to $\chi^2_{.025} = 59.34$ reject H_0

(135) $H_0: \mu = 80$, $H_a: \mu < 80$; t test stat: (assume normal pop'l): $\frac{\bar{x} - \mu_0}{\frac{s}{\sqrt{n}}} \sim t_{n-1\,df}$; value of test stat $= -3.46$; rej H_0, claim H_a

(112, 113, 114) Chpt 9: 106 (12th Ed: 106, 107, 111, 112) (a) 2 good indpt random samples (b) part a's assumptions and each pop'l normal dist with common variance. 106c good random pair selection; normal pop'l differences (d) 2 good random indpt samples n,p's large for CLT. (e) 2 good indpt samples & normal pop'ls.

107 (a) $\mu_1 - \mu_2$ (b) $\mu_1 - \mu_2$ (c) $p_1 - p_2$ (d) $\frac{\sigma_1^2}{\sigma_2^2}$ (e) $p_1 - p_2$ (111) (a) $\bar{x}_1 - \bar{x}_2 \pm z_{\frac{.10}{2}}\cdot\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}$; (b) Test stat: $\frac{\bar{x}_1 - \bar{x}_2 - 0}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}} \sim$ std normal.

value test stat: 20.60; rej. reg. is $z_{CALC} > z_{\alpha/2}$ or $z_{CALC} < -z_{\alpha/2}$; here $z_{\alpha/2} = z_{\frac{.01}{2}} = 2.57$, so rej. H_0, claim H_a (c) set $z_{\frac{.01}{2}}\sqrt{\frac{s_1^2}{n} + \frac{s_2^2}{n}} = 2$ and solve for n.

(110, 111, 112, 113, 119) Chpt 11: 104, 105, 106, 107, 113: for (104, 105, 106), see pgs 561-563; (107) is true

(113) (a) positive (b) yes (c) $\hat{y} = -85.68 + 614.04x$ (e) β_1: slope of line: $\frac{\Delta y}{\Delta x}$ (d) β_0: y-intercept of the line's value for y when x=0.

(f) $H_0: \beta_1 = 0$, $H_a: \beta_1 \neq 0$; t test stat: $\frac{\hat{\beta}_1 - 0}{s_{\hat{\beta}_1}} \sim t$ with 14-2 df.; $t_{CALC} = 1.82$; $t_{CRIT} = t_{\frac{.10}{2}} = 1.78$, so rej H_0, claim H_a (h) $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1(.285)$ (g) $r^2 = .2165$, fract of varicb. explad

(156, 158, 160) Chpt 12: 144, 142, 146, 150 (144) yes, not random scatter about 0 (142) $\hat{y} = \hat{\beta}_0 + \hat{\beta}_1 x_1 + \hat{\beta}_2 x_2 = 90.1 + -1.8x_1 + .28x_2$; $R^2 = .916$ (c) $F_{CALC} = 64.9$, p-value = .001, model "useful"

(d) $t_{CALC} = -5.01$ with p-value = .001, reject H_0; (e) ~~s = estimate of $\sqrt{\sigma^2}$~~; here $s = \sqrt{114} = 10.7$; typical amt y is off from $\hat{y}$ in (2-factor) reg model.

(146) (a) not H_0: i.e. (a) least one of β_4 or β_5 is $\neq 0$ (b) $\frac{(SSE_R - SSE_C)/2}{SSE_C/(n-(5+1))}$ where reduced (R) is $E(y) = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_1^2$; numdf = 2, dendf = n-(5+1); rej region $> F_\alpha$

not in 12th ed. — 150 separately for each case: $E(y) = \beta_0 + \beta_1(\text{HSGPA}) + \beta_2(\text{SH}) + \beta_3(\text{SAT})$; $\beta_2 = \Delta E(y)$ per unit ΔSH when HSGPA & SAT kept same (b) estimates of $\hat{\beta}_3$ so est $\Delta E(y)$ per unit ΔSAT when other 2 variables kept same (c) for blacks, no signif HSGPA effect; but for whites, signif HSGPA effect.

ALSO STUDY PDF FILES OF CHAPTER 12 & TIME SERIES REVIEW PROBLEMS, WITH ~~GEOMETRIC~~, VECTORS, TIME SERIES ANSWERS (FROM LAST TEST'S REVIEW)