KFUPM

Multiple choice questions

1 - test stat = $\frac{51-50}{21/\sqrt{9}} = \frac{1.1 \times 3}{21} = \frac{33}{21} = 1.57$

p-value = $2P(t(8) > 1.57)$ =

$0.05 < P(t(8) > 1.57) <$ → R-value

$0.1 < P\text{-value}$ → (a) is the answer

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2 - (C)

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3 - (d) | 4 - (a) if we add the population is normal

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5 - (d) since Z-score = $\frac{4-0}{1} = 4 > 3$

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6 - (C) since length of interval = $2z_{\alpha/2}\frac{\sigma}{\sqrt{n}}$

desired length = $z_{\alpha/2}\frac{1}{3} \times 2\frac{\sigma}{\sqrt{n}} = \frac{20}{\sqrt{9n}}$

9×90

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7 - (C) | 8 - (C) → male or female

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9 - $e^{-2.5}$, $\theta = ?$ |

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10 - Let X be Jessica's commuting time in a traveling day. X has $N(15, 4)$

$P(X < a) = 0.04 \rightarrow P(Z < \frac{a-15}{2}) = 0.96 \rightarrow \frac{a-15}{2} = 1.75$

Continue of #10 :

→ $a = 18.5$ → ~~Shea~~ Jessica should leave her place at 8am - 18.5min

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→ (d) is correct answer for Question 10

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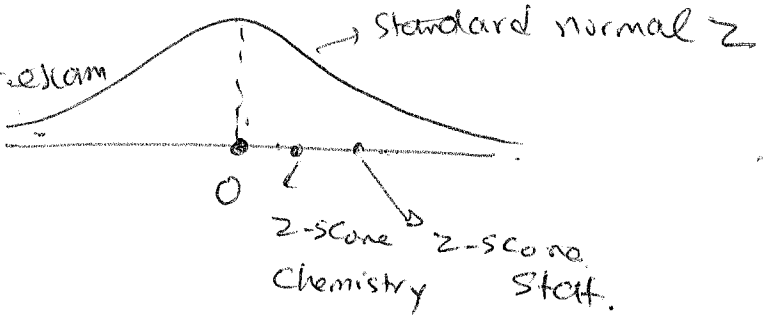
11 - z-score Chemistry $= \frac{102 - 90}{64} = \frac{12}{64} = 0.187$

z-score stat $= \frac{77 - 70}{16} = \frac{7}{16} = 0.4375$

did better on the stat exam



(b)

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(12) - $1 - \frac{1}{64} = \frac{3}{4}$ $\quad \bar{x} - 2s, \bar{x} + 2s$

$1 - \frac{1}{9} = \frac{8}{9}$ $\quad 20 - 2 \times 5, 20 + 2 \times 5$

$10, 30$

$15 - 25,$

12 - (b) ~~range must have been~~ $\sigma \approx \frac{\text{Range}}{4} = \frac{35}{4} = 8.75$ far from 5

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13 - none

$P(A \cup B) = 0.9$

$P(A|B) = \frac{0.3}{0.7} = 0.4 \ldots$

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14 - ~~$P(A \cap B) = P(A|B)P(B)$~~ = (d)

$P(A \cup B) = 0.46$

15 - (b)

Review Long answer questions 3/1

1- X has $N(174, \underbrace{36}_{\sigma^2})$

(a) $P(170 \leq X \leq 179) = P\left(\frac{170-174}{6} \leq Z \leq \frac{179-174}{6}\right)$

$= P\left(\frac{-2}{3} \leq Z \leq \frac{5}{6}\right) = P(Z \leq 5/6) - P(Z \leq -2/3)$

$= ? - ?$

(b) $P(X > a) = 0.05 \longrightarrow P(X \leq a) = 0.95$

X: height of a man; a: the ceiling height

$\longrightarrow P\left(Z \leq \frac{a-174}{6}\right) = 0.95$

(C) $P(\bar{X} > 176) \rightarrow \bar{X} \sim N(174, \frac{36}{49})$

$= P\left(Z \leq \frac{176-174}{6/7}\right)$

$\rightarrow \frac{a-174}{6} = 1.64$ (or 1.65) $\rightarrow a = ?$

2- $H_0: \mu_{Marriot} - \mu_{Radison} = 0$ at $\alpha = 0.01$

$H_a: \mu_{Marriot} - \mu_{Radison} \neq 0$ $\quad n_1 = n_2 = 50$.

(a) test stat: $\mathcal{Z} = \frac{170 - 145 - 0}{\sqrt{\frac{(15)^2}{50} + \frac{(10)^2}{50}}} = \frac{35}{2.55} = 13.72.$

critical points: $-z_{0.005} = -2.57$, $z_{0.005} = 2.57$.

$\hookrightarrow z_{0.995}$

Since $13.72 > 2.57 \longrightarrow$ We reject H_0

i.e., there is a difference

(b) P-value $= 2P(Z < -13.72) \approx 0.$ $\rightarrow$ Yes the two methods are

Review Long answer questions page 411

3- (Paired difference) two samples are dependent.

H_0: $\mu_d = \mu_{before} - \mu_{after}$

H_0: $\mu_d = 0$ (not effective)

H_a: $\mu_d < 0$ (effective)

$d_1 = 500 - 510 = -10$

$d_2 = -5$, $d_3 = 0$, $d_4 = -5$, $d_5 = -3$

$\bar{d} = -4.6$, $s_d^2 = 13.3 \rightarrow s_d = 3.64$

$$t = \frac{\bar{d} - 0}{s_d/\sqrt{n}} = \frac{-4.6}{3.64/\sqrt{5}} = -2.825$$

Critical value $= -t_{0.05}(4) = -2.13$

Since $-2.825 < -2.13 \rightarrow$ we reject H_0 i.e, it is effective.

μ_A: average time fish spoilage begins with preservative A

μ_B: " " " " B

(a) H_0: $\mu_A = \mu_B = 0$ $\quad n_1 = n_2 = 10$

" H_a: $\mu_A - \mu_B \neq 0$

Review Long answer pages 5//

Continue question 4:

$$s_p^2 = \frac{9((9.5)^2+(11.5)^2)}{18} = 111.25.$$

test statistic: $t = \frac{108.7-98.7}{\sqrt{s_p^2\left(\frac{2}{10}\right)}} = 2.11.$

Critical value at $\alpha = 0.05$ is $t_{0.025}(18) = 2.101$

Conclusion, since $2.11 > 2.101$ → we reject H_0

i.e., there is a significant difference when preservatives A or B are used.

5- $\bar{x} \pm z_{0.025}\frac{s}{\sqrt{n}} = 12.5 \pm 1.96\frac{3.4}{\sqrt{225}}$

6- X: # of products sold $X \sim Bin(140, 0.05)$

$P(X \geq 2) = 1 - P(X \leq 1) \approx 1 - P(Y \leq 1)$ (Y has Pois(7))

$= 1 - 0.07$

$np = 140 \times 0.05 = 7$

7- X: # of improperly documented travel expenses in the 200 examined ones. $X \sim Bin(200, 0.1)$

$P(X > 49) = 1 - P(X \leq 50) = 1 - P\left(Z \leq \frac{50+0.5-20}{\sqrt{\quad}}\right) = ?$ (np)

~~$r = \frac{S_{xy}}{S_x S_y}$~~ # 8:

$$S_{xy} = \frac{\sum x_i y_i - \frac{(\sum x_i)(\sum y_i)}{n}}{n-1} = 54.285$$

$S_x = 1.457$

$S_y = 38.172$, $\bar{y} = 80$, $\bar{x} = 3.125$

$$r = \frac{S_{xy}}{S_x S_y} = 0.975$$

$$y = 0.975 \times \frac{38.172}{1.452} x + \left(80 - 0.975 \frac{38.172}{1.452} \times 3.125\right)$$

~~$y = 0.1681 x$~~ $y = 25.546 x + 0.1681$.

at $x = 6 \rightarrow y = 25.546 \times 6 + 0.1681 = ?$