

MTH 214 Sample final solutions (corrected)

(Q1) a) i) $\frac{1}{2} \times \frac{1}{2} = \frac{1}{4}$ ii) draw 6x6 grid and count $\approx \frac{1}{2}$.

b) i) $H_0: \mu = 120$ ii) test statistic $\frac{\bar{x}-\mu}{s/\sqrt{n}} \sim t, df=23$ 95% confidence interval $t^* = 2.069$
 $H_a: \mu \neq 120$

iii) $\frac{128-120}{12.3/\sqrt{23}} = 3.119$, p-value = $2(1 - pt(3.119, df=23)) = 0.0048$

significant at 95% level, reject H_0 , i.e. significant evidence CSI students have different blood pressure.

iv) $\bar{x} \pm t^* s/\sqrt{n} = (122.7, 133.3)$

v) assume $\sigma = s = 12.3$, critical values for \bar{x} are $120 \pm t^* s/\sqrt{n} = (114.7, 125.3)$

~~$H_0: \mu = 130$~~ power = $p_{\text{norm}}\left(\frac{114.7-130}{12.3/\sqrt{23}}\right) + 1 - p_{\text{norm}}\left(\frac{125.3-130}{12.3/\sqrt{23}}\right)$
~~114.7 120 130~~
~~-5.96 -1.83~~
= 97%

Q1 paired t-test H_0 : difference in means 0 $\mu_{2017} = \mu_{2018}$

$$H_a: \mu_{2017} > \mu_{2018}$$

Q2 two sample proportion test $H_0: p_1 = p_2$ $H_a: p_1 > p_2$

Q3 χ^2 goodness of fit H_0 : all day equally likely H_a : not all equally likely

Q4 χ^2 test of independence H_0 : variables independent H_a : variables not independent

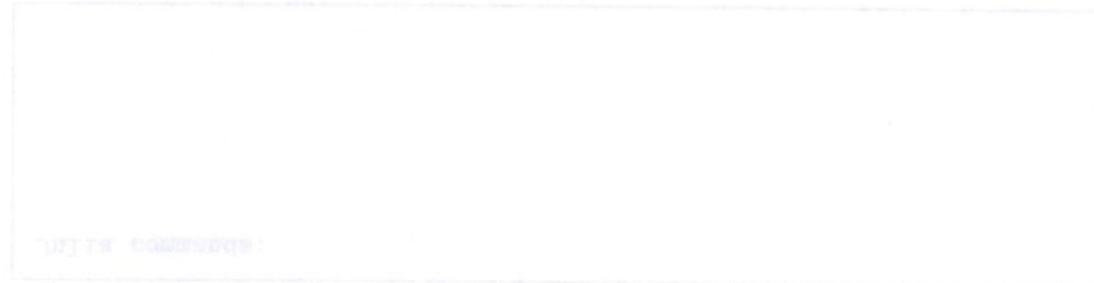
Q5 H_0 : variables independent, H_a : variables not independent. Test not significant at 5% level

Q6 $H_0: \mu_1 = \mu_2$ $H_a: \mu_1 > \mu_2$ Columbia $\mu_1 = 11.36711$ not significant
Lewis $\mu_2 = 11.28962$ at 5% level.

Q7 conditions for linear regression: SRS, common $N(0, \sigma^2)$ residuals indep of x .
yes, satisfied.

Q8 TFTFQ9 SRS, numbers of success, failures ≥ 5 . Yes.Q10 sample size $15 \leq n \leq 40$, then use if not skewed or outliers. not satisfied.Q11 $\hat{p} = \sqrt{\hat{p}(1-\hat{p})/n}$ $\hat{p}^* = 1.96$ $\hat{p} = 23/50 \approx (0.0366, 0.0554)$ want $z = \sqrt{\hat{p}(1-\hat{p})/n} \leq 0.01$, $n = \left(\frac{1.96}{0.01}\right)^2 \hat{p}(1-\hat{p}) = 1686$.Q12 FFTTFQ13 TTFQ14 TTFQ15 TTTTFT

- " If the graph of the upper bound of $V(x)$: the bound where $\lambda_0(x) = 0$ contains a local maximum, then there is a unique local minimum for $V(x) = 0$ for $0 \leq x \leq 10$. Write down the graph



- " Write the formulae according to the following figures:
 " More than one local minimum and local maximum to do this
 $V(x) = \sqrt{x+3} + 0.02(x-10)$
 To show the ability to modify the graph of a function

SOLUTION

" The graph of the upper bound of $V(x) = 0$ is as follows:

With 330 0ms dr