PROB

Assignment 3

211-3153

(Q1) 50 workers . average 2.1 hrs distr (modern)

$\bar{x}$ = 1.8 hrs . std = 20min (population)

find true population distraction. 90% confidence

$\alpha = 10\%$ $\frac{10}{2} = 5\% = 0.005$

sample std: $\frac{20}{60} = \frac{1}{3}$

Zcrit = $-1.64, +1.64$, ~~1.64~~

~~1.8 + 1.65~~ $1.8 - 1.65\left(\frac{1/3}{\sqrt{50}}\right) = \boxed{1.72}$

or

$1.8 + 1.65\left(\frac{1/3}{\sqrt{50}}\right) = 1.88$

true distraction lies between 1.72 and 1.88

modern average is higher

Q2

225 240 215 206 211 240 193 250
228 202

$n < 30$

95% . Estimate true mean

$\bar{x} = 217.7$ ~~$s = (225 - 217.7)^2$~~

$\alpha = 5\%$ $\frac{5}{2} = 2.5\%$ $\boxed{0.025}$

$v = 10 - 1 = 9$

$t = 2.262$

$s = \sqrt{\frac{(225-217.7)^2 + \cdots + (202-217.7)^2}{9}}$

~~$217.7 + 2.262 (17.49$~~

$s = 17.49$

$$217.7 + 2.262\left(\frac{17.49}{\sqrt{10}}\right) = 230.21$$

$$217.7 - 2.262\left(\frac{17.49}{\sqrt{10}}\right) = 205.19$$

$\boxed{230.21 \leq \text{True mean} \leq 205.19}$

(Q3) $H_0 = 42{,}000$ $\bar{x} = 43{,}260$

$H_1 > 42000$

$\alpha = 0.05$, $B = 0.95$

pop $\sigma = \$5230$

$$z = \frac{\bar{x} - H_0}{\sigma/\sqrt{n}}$$

z crit = 1.65

$$\frac{43260 - 42000}{5230/\sqrt{30}} = 1.319$$

$1.319 < 1.65$

thus

H_0 is not rejected.

can not be said if avg > 42000

(Q4)

$H_0 = 24b$

$H_1 : > 24b$

$b = 0.95$

$\alpha = 0.05 \quad s = 28.7$

$\bar{x} = \frac{1476}{51} = 28.94$

$z_{crit} > 1.65$

$$z = \frac{28.94 - 24}{28.7/\sqrt{51}} = 1.229 \approx 1.23$$

$P(z > 1.23) = 1 - 0.8907 = 0.1093$

will not reject Ho as value is greater than $\alpha = 0.05$

(Q6) 12 n1 10 n2

$\bar{x} = 85$ $\bar{x} = 81$

$s = 4$ $s = 5$

$\alpha = 0.05$ $\beta = 0.95$

$H_0 = 2$

$H_0 > 2$

$$S_p = \sqrt{\frac{11(16) + 9(25)}{12 + 10 - 2}} = 4.478$$

$v = n_1 + n_2 - 2 = 10 + 12 - 2 = 20$

$t_{crit} = 1.725$ $t > 1.725$

$$t = \frac{(85 - 81) - 2}{4.478\sqrt{\frac{1}{12} + \frac{1}{10}}} = \boxed{1.04}$$

$1.04 < 1.725$ thus accepted

difference greater than 2 units

Q5 $\bar{x} = \frac{77}{20} = 3.85$

$S = \sqrt{\frac{(3-3.85)^2 + \ldots (1-1.85)^2}{19}} = \boxed{2.52}$

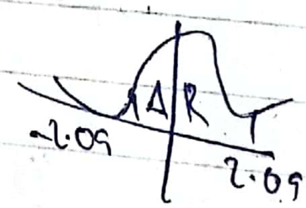
$H_0 = 5.8$ $\alpha = 0.05$ $\beta = 0.95$

$H_a \neq 5.8$

$\frac{0.05}{2} = \boxed{0.025}$

$v = 19$

$t_c = 2.093$



$t = \frac{3.85 - 5.8}{2.52/\sqrt{20}} = -3.46$

doesn't lie in AR, rejected

Q1

(a)

xy	x^2	y^2
1254	361	4356
1702	529	5476
1800	625	5184
1824	576	5776
2028	676	6084
1512	441	5184

$\Sigma x = 138$ $\Sigma y = 438$

$\Sigma xy = 10120$ $\Sigma x^2 = 3208$ $\Sigma y^2 = 32060$

$$r = \frac{6 \times 10120 - 138 \times 438}{\sqrt{6 \times 3208 - (138)^2 \times 6 \times 32060 - (438)^2}}$$

0.8507

bec $r \approx 1$, ~~strong~~ correlation is strong

(b) $\hat{y} = a + bx$

$$a = \frac{(438)(3208) - (138)(10120)}{6 \times 3208 - (138)^2}$$

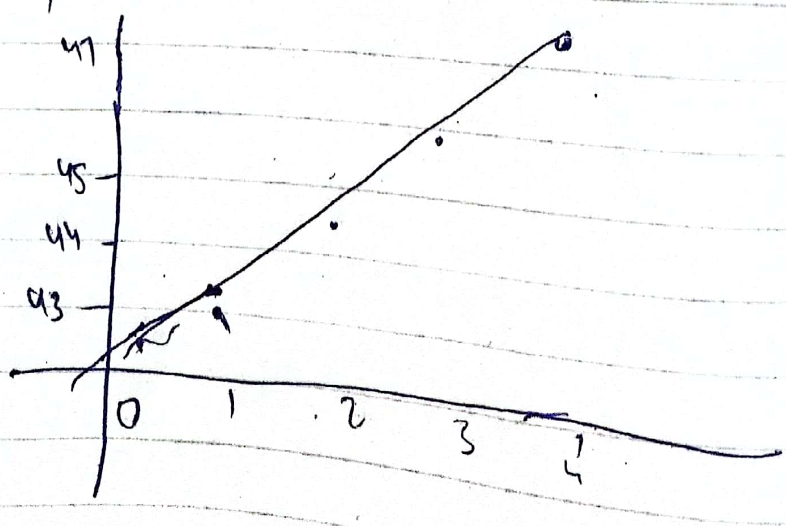
$$\boxed{41.882}$$

$$b = \frac{(6)(10120) - (138)(438)}{6 \times 3208 - (138)^2}$$

$$\boxed{1.353}$$

$$\hat{y} = 41.882 + 1.353x$$

x	-1	0	1	2	3	4
y	40.529	41.882	43.235	44.588	45.941	47.29

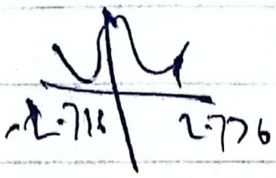


(c) $\hat{y} = 41.882 + 1.353(30) = 82.47 \approx 83$

(d) $\alpha = 0.05$ $\qquad \frac{0.05}{2} = 0.025$

$$t = 0.8507\sqrt{\frac{6-2}{1-(0.8507)^2}} = 3.2367$$

$v = 4$ $\qquad t_c = 2.776$



t in A.R, thus accepted

temperature ha no signifcant effect

Q8

$\Sigma x = 311.6$

$\Sigma y = 297.2$

$\Sigma x^2 = 8134.26$

$\Sigma y^2 = 7407.8$

$\Sigma xy = 7687.76$

$\hat{y} = a + bx$

$$a = \frac{297.2 \times 8134.26 - 311.6 \times 7687.76}{12 \times 8134.26 - (311.6)^2}$$

42.582

$$\cancel{b = \frac{n(\Sigma xy) - (\Sigma x)(\Sigma y)}{n(\Sigma x^2) - (\Sigma x)^2}}$$

$$b = \frac{12(7687.76) - (311.6)(297.2)}{12(8134.26) - (311.6)^2} = \boxed{-0.}$$

$\hat{y} = 42.582 - 0.686x$

(b) normal stree = 24.5

$$42.582 - 0.686(24.5) = 25.775$$

$$\boxed{25.8}$$