Maths Assignment - 1

	Attacked	Not Attacked	Total
Vaccinated	35 (a)	308 (b)	343
Not Vaccinated	333 (c)	806 (d)	1139
Total	368	1114	1482

Using chi square Test. $N = a+b+c+d = 1482$

Formula: $\psi^2 = \frac{\Sigma(O-E)^2}{E}$

Ho: There is no vaccination can be regarded

H1: There is vaccination can be regarded as preventive measure of Small pox as evidenced.

$$\psi^2 = \frac{\Sigma(O-E)^2}{E} = \frac{N(ad-bc)^2}{(a+c)(b+d)(c+d)(a+b)}$$

$$= \frac{1482[(35\times806)-(308\times333)]^2}{(35+333)(1114)(1139)(343)}$$

$$\psi^2 = \frac{8.193\times10^{12}}{1.601\times10^{11}} = 51.174$$

$$\boxed{\psi^2 = 51.174}$$

Dof : $(r-1)(c-1)$

$= (2-1)(2-1) = 1$

$\psi^2_{5\%,(1)} = 3.841$

$|\psi^2 > |\psi^2_{5\%,(1)}|$

Hence, Ho is rejected.

(8)

Condition of Home	Condition of Child (Clean)		
Clean	70	50	120
Family clean	80	20	100
Dirty	35	45	80
	185	115	300

$\alpha = 5\%$, $\chi^2 = \frac{\Sigma(O-E)^2}{E}$

H_0: Two attributes are independent

H_1: Not independent.

$df = (r-1)(c-1)$

$= (3-1)(2-1) = 2.$

$(\chi^2_{\alpha})(2) = 5.99.$

Expected frequency: $\left(\frac{R_T \times C_T}{\text{Grand Total}}\right)$

$E_{11} = \frac{120 \times 185}{300} = 74$

$E_{12} = \frac{100 \times 185}{300} = 61.66$ ~~$= 61.67$~~

$E_{13} = \frac{80 \times 185}{300} = 49.34$

$E_{21} = \frac{120 \times 115}{300} = 46$

$E_{22} = \frac{100 \times 115}{300} = 38.34$

$E_{23} = \frac{80 \times 115}{300} = 30.66$

$\Sigma E = 300.$

			$(O-E)^2$	$\Sigma O = \Sigma E = 300$
	74			
.0	46	-4	16	$\frac{\Sigma(O-E)^2}{E}$
80	61.66	4	16	0.216
20	38.34	18.34	336.35	0.347
35	49.34	-18.34	336.35	5.454
45	30.66	-14.34	205.635	8.772
		14.34	205.635	4.167
				6.706

$\frac{\Sigma(O-E)^2}{E} = 25.662$

$\chi^2 = \frac{\Sigma(O-E)^2}{E} = 25.662$

$|\chi^2| > |\chi|^2_{5\%,(2)}$

Hence Ho is rejected

(3) Given, $n = 200$, $\alpha = 5\%$, $95\% = ?$

$n > 30$, hence z test,

$\bar{x} = 1 - x = 0.0$

Ho: $\mu > 0.95$ $\quad x = 18.$

H1: $\mu < 0.95$ $\quad \hat{p} = \frac{\Sigma x}{n} = \frac{18}{200} = 0.0$

Hence $Z_{5\%} = \left|\frac{\bar{x} - \mu}{\sigma/\sqrt{n}}\right|$, $\quad |0.91 - 0.$

$= \frac{0.91 - 0.95}{\sqrt{\frac{0.95(1-0.95)}{200}}}$

$= -2.60$

$|Z|_{5\%} = -1.645$

Hence Ho is rejected

(4) Sample 1 19 17 15 21 16 18 16 14
Sample 2 15 14 15 19 15 18 16 -

H_0: There is no significant difference
H_1: There is significant difference

By using t test

$$\bar{x}_1 = \frac{\sum x_1}{n} = \frac{136}{8} = 17$$

$$\bar{x}_2 = \frac{\sum x_2}{n} = \frac{112}{7} = 16$$

$$s_1^2 = \frac{(\sum x_1)^2}{n} - (\bar{x}_1)^2 = 4.5$$

$$s_2^2 = \frac{(\sum x_2)^2}{n} - (\bar{x}_2)^2 = 2.857$$

$$\sigma^2 S_{\bar{x}} = \frac{n_1 s_1^2 + n_2 s_2^2}{n_1 + n_2 - 2} = 4.317$$

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sigma \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} = \frac{17 - 16}{2.07 \sqrt{\frac{1}{8} + \frac{1}{7}}} = \frac{1}{2.07 \sqrt{0.517}}$$

$$= 0.9334$$

$$df = 8 + 7 - 2$$
$$= 13$$

$$t_{5\%}(13) = 2.160$$

Yes, it lies b/w the interval

Hence H_0 is accepted

There is no significant difference