

## Part-2

Q. Performing hypothesis testing using The chi-squared test.

	Action/ Adventure	Romance	Biography	Total
18-29	141	68	4	213
30-44	179	159	7	345
45-64	220	216	4	440
65 & older	86	101	4	191
Total	626	544	19	1189

\* Degrees of freedom,  $df = (r-1)(c-1)$   
 $r = \text{rows}$   $c = \text{columns}$

$$df = (4-1)(3-1) = 6 //$$

level of significance = 5%.

\* Expected frequency =  $\frac{(\text{Row Total} * \text{Column total})}{N}$   
 $N = 1189$

a) 18-29

$$> \text{Action/Adventure} = \frac{213 * 626}{1189} = \underline{\underline{112.1}}$$

$$> \text{Romance} = \frac{213 * 544}{1189} = \underline{\underline{97.45 \approx 97.5}}$$

$$> \text{Biography} = \frac{213 * 19}{1189} = \underline{\underline{3.4}}$$



b) 30-44

$$> \text{Action/Adventure} = \frac{345 \times 626}{1189} = \underline{\underline{181.6}}$$

$$> \text{Romance} = \frac{345 \times 544}{1189} = \underline{\underline{157.2}}$$

$$> \text{Biography} = \frac{345 \times 19}{1189} = \underline{\underline{5.5}}$$

c) 45-64

$$> \text{Action/Adventure} = \frac{440 \times 626}{1189} = \underline{\underline{231.7}}$$

$$> \text{Romance} = \frac{544 \times 440}{1189} = \underline{\underline{201.3}}$$

$$> \text{Biography} = \frac{440 \times 19}{1189} = \underline{\underline{7.0}}$$

d) 65 & older

$$> \text{Action/Adventure} = \frac{626 \times 191}{1189} = \underline{\underline{100.6}}$$

$$> \text{Romance} = \frac{544 \times 191}{1189} = \underline{\underline{87.4}}$$

$$> \text{Biography} = \frac{19 \times 191}{1189} = \underline{\underline{3.1}}$$

\* Test statistic,

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

E = Expected Frequency

O = Outcome variable



$$\begin{aligned}
 \chi^2 = & \frac{(141-112.1)^2}{112.1} + \frac{(68-97.5)^2}{97.5} + \\
 & \frac{(4-3.4)^2}{3.4} + \frac{(179-181.6)^2}{181.6} + \frac{(159-157.8)^2}{157.8} + \\
 & \frac{(7-5.5)^2}{5.5} + \frac{(220-231.7)^2}{231.7} + \frac{(216-201.3)^2}{201.3} + \\
 & \frac{(4-7)^2}{7} + \frac{(86-100.6)^2}{100.6} + \frac{(101-87.4)^2}{87.4} + \\
 & \frac{(4-3.1)^2}{3.1}
 \end{aligned}$$

$$\begin{aligned}
 &= 7.5 + 8.9 + 0.1 + 0.03 + 0.01 + 0.4 \\
 &+ 0.6 + 1.1 + 1.3 + 2.1 + 2.1 + 0.3 \\
 &= \underline{\underline{24.44}}
 \end{aligned}$$

Critical value = 12.59.

$$\therefore \chi^2 = 24.44,$$

$$\chi^2 > 12.59$$

Rejected

No relationship between the age group and their movie genre inclination.

