Problem, Chapter-8: Two hundred Engineers were interviewed and classified according to their results and job satisfaction. The distribution of graduates by results and job satisfaction are given in the following contingency table:

Results	Job satisfaction	
	Yes	No
Excellent	20	70
Good	45	65

Test at 5% level of significance whether there is any relationship between results and job satisfaction.

(Note: At 5% level of significance tabulated value of Chi-square @ 1df =3.84)

Solution: We consider the following hypothesis

H0: There is no relationship between results and job satisfaction.
H1: There is a relationship between results and job satisfaction.

Results	Job satisfaction		Total
	Yes	No	
Excellent	20 (O_{11})	70(O_{12})	90
Good	45(O_{21})	65(O_{22})	110
Total	65	135	200

We know, $$\chi^2=\sum \frac{(O_{ij}-E_{ij})^2}{E_{ij}}$$

Here, $E_{11}=\frac{90\times 65}{200}=29.25$, $E_{12}=\frac{90\times 135}{200}=60.75$, $E_{21}=\frac{110\times 65}{200}=35.75$, $E_{22}=\frac{110\times 135}{200}=74.25$

Therefore, $$\chi^2=\frac{(20-29.25)^2}{29.25}+\frac{(70-60.75)^2}{60.75}+\frac{(45-33.75)^2}{33.75}+\frac{(65-74.25)^2}{74.25}$$

$$= 2.93+1.41+3.75+1.15 = 9.24\ [\chi^{2}{}_{.05(1)}=3.84]$$

Comment: Reject H0, There is a relationship between results and job satisfaction.