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(1) Ans.

~~given~~ 1 decimal place:

Add up rows and columns:

| | Chicken | Burger | chinese | |
|---|---|---|---|---|
| ≤20 | 106 | 119 | 25 | 250 |
| ≥20 | 117 | 141 | 92 | 350 |
| | 223 | 260 | 117 | 599 |

Calculate: Expected value:

| | chicken | Burger | chinese | |
|---|---|---|---|---|
| ≤20 | $\frac{223 \times 250}{599}$ | $\frac{260 \times 250}{599}$ | $\frac{117 \times 250}{599}$ | 250 |
| ≥20 | $\frac{223 \times 350}{599}$ | $\frac{260 \times 350}{599}$ | $\frac{117 \times 350}{599}$ | 350 |
| | 223 | 260 | 117 | 599 |

| | Chicken | Burger | chinese | |
|---|---|---|---|---|
| ≤20 | 93.071 | 108.514 | 48.831 | 250 |
| ≥20 | 130.300 | 151.919 | 66.353 | 350 |
| | 223 | 260 | 117 | 599 |

Subtract expected from actual, square,

| | Chicken | Burger | chinese | |
|---|---|---|---|---|
| ≤20 | $\frac{(106-93.07)^2}{93.07}$ | $\frac{(119-108.51)^2}{108.51}$ | $\frac{(25-48.83)^2}{48.83}$ | 250 |
| ≥20 | $\frac{(117-130.30)^2}{130.30}$ | $\frac{(141-151.91)^2}{151.91}$ | $\frac{(92-68.25)^2}{68.25}$ | 350 |
| | 223 | 260 | 117 | 599 |

| | Chicken | Burger | Chinese | ? |
|---|---|---|---|---|
| ≤20 | 1.79 | 1.014 | 11.62 | 250 |
| ≥20 | 1.35 | 0.78 | ~~15.00~~ 8.26 | 350 |
| | 223 | 260 | 117 | 599 |

Now add up those values.

1.79 + 1.014 + 11.62 + 1.35 + 0.78

+ 8.26 = ~~31.55~~

24.81 (Ans.)

# Answer to the question-2

**Step 1:** Hypothesise for the uniformity:

$H_0$ = Riv independenty

$H_1$ = Ri~ independently.

**step: 2:** ·06, 0·2, ·11, ·56, ·43, ·15, ·32, ·82, ·16, ·39

**Step 3:** + − + + + − − − + + − + a = 7 N = 10

**Step 4:** If a is the total number of runs in a truly random sequence. The mean and variance of a is given by

$$= \mu_a = \frac{2N-1}{3} = \frac{2.10-1}{3} = \frac{20-1}{3} = \frac{19}{3}$$

$$= 6.333$$

and $\sigma^2 = \frac{16N - 29}{90}$

$= \frac{16.10 - 29}{90}$

$= \frac{160 - 29}{90}$

$= \frac{131}{90}$

$= 1.46$ [Appx]

$\therefore \sigma = 1.2$

Step 5:- $Z_0 = \frac{a - \mu_a}{\sigma_a}$

$Z_0 = \frac{a - [(2N - 1/3]}{\sqrt{(16N - 29)/90}}$

$= \frac{7 - 6.333}{1.46}$

$= \frac{0.667}{1.46}$

$= 0.456$ [Appx]

Step 6:- $-1.96 < 0 < +1.96$

Step 7:- $-1.96 \leq 0.456 \leq 1.96$

Ho is not rejected

$= 0.456$ [Appx]

~~Step 8~~

## Answer to the question no-3

Step 01: Hypothesis for uniformity

$H_0 = R_i \sim U(0,1)$ [$R_i$ = Random]

$H_1 = R_i \not\sim U(0,1)$.

Step 2: $E_i = N/n \geq 5$

$10/n \geq 5$

So $n \leq 20$

Step 3:

| Interval | $O_i$ | $E_i = N/n = 100/10$ | $(O_i - E_i)^2 / E_i$ |
|---|---|---|---|
| 0.0 – 0.1 | 8 | 10 | 0.4 |
| 0.1 – 0.2 | 8 | 10 | 0.4 |
| 0.2 – 0.3 | 10 | 10 | 0 |
| 0.3 – 0.4 | 9 | 10 | 0.1 |
| 0.4 – 0.5 | 12 | 10 | 0.4 |
| 0.5 – 0.6 | 8 | 10 | 0.4 |
| 0.6 – 0.7 | 10 | 10 | 0 |
| 0.7 – 0.8 | 14 | 10 | 1.6 |
| 0.8 – 0.9 | 10 | 10 | 0 |
| 0.9 – 1.0 | 11 | 10 | 0.1 |
| | = 100 | | = 3.4 |

Step 4:-

$\alpha = 0.05$, $n = 10$; $(n-1) = 10-1 = 9$

m terms of 5 2 9 5

$\chi^2_{\alpha = 0.05, 9} = 16.9$

Step 5:-

$\chi^2_{\alpha} > \chi^2_{0}$ where $16.9 > 3.4$

So this 10 is accepted.