

Study Questions SOLUTIONS

A

A survey was conducted of television viewership. A group of 300 viewers were asked which type of TV show they prefer. The results were organized into the table below.

| | Drama | Comedy | Reality | Sports |
|---------------------------|-------|--------|---------|--------|
| Aged 30 years and Younger | 65 | 128 | 57 | 50 |
| Older than 30 Years Old | 75 | 110 | 43 | 72 |

A χ^2 test was carried out, at the 5% significance level. The χ^2 critical value of the test is 7.82.

- (a) Write down the null hypothesis for this test. [1]
- (b) Write down the number of viewers who preferred sports and were older than 30 years old. [1]
- (c) Use your graphic display calculator to find the χ^2 statistic for this test. [2]
- (d) Determine, giving a reason, whether the null hypothesis should be accepted. [2]

Working.....

poor wording

- (a) $H_0 =$ Age and TV genre preference are independent.
- (b) 72
- (c) $\chi^2 = 8.00$
- (d) Since χ^2 statistic is > 7.82 , H_0 should be rejected

(6 marks)

B

A real estate developer conducted a survey. He asked 100 people who live in the city and 100 people who live in the suburbs if they prefer bicycling, driving, walking, or taking public transportation to work. The results are shown in the table below.

| | City | Suburbs |
|-----------------------|------|---------|
| Bicycle | 15 | 20 |
| Drive | 35 | 30 |
| Walk | 15 | 20 |
| Public Transportation | 35 | 30 |

A χ^2 test was conducted at the 5% significance level.

- (a) Write down the null hypothesis for this test. [1]
- (b) Write down the number of degrees of freedom. [1]
- (c) Use your calculator to find the p -value for this test. [2]

The surveyor claims that whether people live in the city or suburbs is independent of their choice of getting to work.

- (d) Determine whether this claim is justified. Give a reason for your answer. [2]

Working.....

- (a) H_0 : where people live is independent of their method commute.
- (b) $df = 3$
- (c) $p = 0.532$
- (d) Since p -value > 0.05 , we fail to reject H_0 .
Therefore, the surveyor's claim is correct. (6 marks)

A data collection consisting of 30 primary years students shows their body weight (W) in kilograms versus the distance (D) in meters they can run in 60 seconds.

The correlation coefficient between variables W and D is -0.928 . The following is also known:

$\bar{W} = 48 \text{ kg}$ and $\bar{D} = 120 \text{ m}$

And the regression equation for the line of best fit between E and V is given by

$y = mx + b$

$D = kW + 192$ where k is a real number constant.

✓✓

a. Find k .

✓✓

b. Use your result from part (a) above to predict the distance D run by a student with a weight W of 45 kg.

Working.....

| | |
|---|--|
| <p>a)</p> $D = kW + 192$ $\begin{matrix} + & + \\ 120 & 48 \end{matrix}$ $\frac{120}{-192} = \frac{k(48) + 192}{-192}$ $48k = -72$ $k = -1.5$ | <p>b)</p> $D = -1.5(45) + 192$ $D = 124.5$ |
|---|--|

(a) $k = -1.5$ ← exact ok

(b) $D = 124.5$ meters ←
 or 125 m ← or 3 s.f.

The table below shows the results of a fitness test given to six middle years students. Each student has corresponding scores for cardiovascular recovery time (T) in seconds after a six minute run along with the distance D in centimetres recorded for a standing jump.

| Student | A | B | C | D | E | F |
|-------------------------|-----|-----|-----|-----|-----|-----|
| Recovery Time (T) - sec | 300 | 420 | 500 | 270 | 600 | 480 |
| Jump Distance (D) - cm | 190 | 175 | 160 | 200 | 140 | 170 |

X Recovery Time (T)
Y Jump Distance (D)

Find the equation of the line of best fit (LSRL) using the formula. Write formulas and critical totals.

$$\bar{X} = 428.3333 \quad \bar{Y} = 172.5 \quad S = 114.6613$$

$$\text{Covariance } S_{xy} = \frac{\sum (x-\bar{x})(y-\bar{y})}{n} = \frac{-13225}{6} = -2204.167$$

$$\text{LSRL } y - \bar{y} = \frac{S_{xy}}{(S_x)^2} (x - \bar{x})$$

$$y - 172.5 = \frac{-2204.167}{(114.6613)^2} (x - 428.3333)$$

$$y - 172.5 = -0.1676 (x - 428.3333)$$

$$y - 173 = 0.168 (x - 428)$$

In Point Slope form as done in class

to check: $y = 0.168x + 244$

Also accepted

recovery time (T)

Jump Distance (D)

$$\bar{X} = 172.5 \quad \bar{Y} = 428.3333 \quad S_x = 114.5256$$

$$\text{Covariance } S_{xy} = \frac{\sum (x-\bar{x})(y-\bar{y})}{n} = \frac{-13225}{6} = -2204.167$$

$$\text{LSRL } y - \bar{y} = \frac{S_{xy}}{(S_x)^2} (x - \bar{x})$$

$$y - 428.3333 = \frac{-2204.167}{(114.5256)^2} (x - 172.5)$$

$$y - 428.3333 = -5.7814 (x - 172.5)$$

$$y - 428 = -5.78 (x - 173)$$

Point Slope form as done in class

to check:

$$y = -5.78x + 1426$$



Showing formulas

✓ critical totals for LSRL

✓ critical in totals correct position for LSRL

✓ Final Answer Accurate to 3 sf w/o premature rounding