## Bivariate Data - Sample Task 2

The table below shows male life expectancy (male) and female life expectancy (female) for a number of countries in 2013. The scatterplot has been constructed from this data.

Life expectancy (in years) in 2013

| male | female |
| :---: | :---: |
| 80 | 85 |
| 60 | 62 |
| 73 | 80 |
| 70 | 71 |
| 70 | 78 |
| 78 | 83 |
| 77 | 80 |
| 65 | 69 |
| 74 | 77 |
| 70 | 78 |
| 75 | 81 |
| 58 | 60 |
| 80 | 86 |
| 69 | 73 |
| 79 | 84 |
| 72 | 81 |
| 78 | 85 |
| 72 | 79 |
| 77 | 81 |
| 71 | 80 |
|  |  |



| Title | Linear R... |
| :--- | ---: |
| RegEqn | $a^{\prime}+b^{*} x$ |
| $a$ | 9.69093 |
| $b$ | 0.807586 |
| $r^{2}$ | 0.9017 |

## Task. 1

Name the response variable in the equation of this least squares line.

Response variable: Male life expectancy (years)

## Task. 2

Determine the equation of the least squares line in terms of the variables male life expectancy and female life expectancy. Write your answers in the appropriate boxes provided below. Round the numbers representing the intercept and slope to three significant figures.

| Male Life expectancy (years) | = | 9.69 |  | 0.808 | x | Female Life expectancy (years) |
| :---: | :---: | :---: | :---: | :---: | :---: | :---: |

## Task. 3

Write the value of the correlation coefficient rounded to three decimal places.

$$
r=0.950
$$

## Task. 4

Describe the association between the two variables, in terms of direction, form and strength.

This indicates there is a strong, positive, linear association between the Male Life Expectancy (years) and the Female Life Expectancy (days).

Task. 5
Write the value of the coefficient of determination rounded to three decimal places.

$$
r^{2}=0.902
$$

## Task. 6

Interpret the coefficient of determination in terms of male life expectancy and female life expectancy.

We can conclude from this that $90.2 \%$ of the variation in Male Life expectancy can be explained by the variation in the Female Life Expectancy.

## Task. 7

Interpret the slope of the least squares line in terms of male life expectancy and female life expectancy.

On average, for every extra year of Female Life Expectancy the Male Life Expectancy increases by 0.808 years.

## Task. 8

Interpret the $\boldsymbol{y}$-intercept of the least squares line in terms of male life expectancy and female life expectancy.

A Female Life expectancy of 0 years predicts a Male Life Expectancy of 9.69 years

## Task. 9

One particular set of data from the table stated that a female life expectancy of 71 years had a male life expectancy of 70 years

Calculate the residual for this set of data, to two decimal places. Show workings out.

Step. 1 Calculate the predicted Male Life Expectancy (years) for a Female Life Expectancy of 71 years.
Male Life Expectancy $($ years $)=9.69+0.808 \times$ Female Life expectancy $($ years $)$
Male Life Expectancy (years) $=9.69+0.808 \times 71$
Life span $($ years $)=67.038$
Step. 2 Calculate the residual for a Female Life Expectancy of 71 years
Residual $=($ Actual $y$ value $)-($ Predicted $y$ value $)$
Residual $=70-67.038$
Residual $=2.962$

```
residual = 2.962
```



