

## National Institute of Electronics and Information Technology, Calicut

### Certified AI Professional

#### Assignment 5

(Total Marks 20, Submit the programs as Assignment5.R)

### Correlation and Regression

For all questions from 1:5, write programs obtain

- Correlation co-efficient and specify the type of correlation.  
(Weak/Strong/Intermediate & Positive/Negative)
- Plot the points and regression line
- Also compute the following

- Five children aged 2, 3, 5, 7 and 8 years old weigh 14, 20, 32, 42 and 44 kilograms respectively. What is the approximate weight of a six year old child?
- The success of a shopping center can be represented as a function of the distance (in miles) from the center of the population and the number of clients (in hundreds of people) who will visit. The data is given in the table below:

<b>No. Customer</b>	<b>8</b>	<b>7</b>	<b>6</b>	<b>4</b>	<b>2</b>	<b>1</b>
<b>Distance</b>	<b>15</b>	<b>19</b>	<b>25</b>	<b>23</b>	<b>34</b>	<b>40</b>

- If the mall is located 2 miles from the center of the population, how many customers should the shopping center expect?
  - To receive 5 customers, at what distance from the center of the population should the Shopping Centre be located?
- The grades of five students in mathematics and chemistry classes are:

<b>Mathematics</b>	<b>6</b>	<b>4</b>	<b>8</b>	<b>5</b>	<b>3.5</b>
<b>Chemistry</b>	<b>6.5</b>	<b>4.5</b>	<b>7</b>	<b>5</b>	<b>4</b>

Calculate the expected grade in chemistry for a student who has a 7.5 in mathematics.

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4. The heights (in centimeters) and weight (in kilograms) of 10 basketball players in a team are:

<b>Height</b>	<b>186</b>	<b>189</b>	<b>190</b>	<b>192</b>	<b>193</b>	<b>193</b>	<b>198</b>	<b>201</b>	<b>203</b>	<b>205</b>
<b>Weight</b>	<b>85</b>	<b>85</b>	<b>86</b>	<b>90</b>	<b>87</b>	<b>91</b>	<b>93</b>	<b>103</b>	<b>100</b>	<b>101</b>

Calculate the estimated weight of a player who measures 208 cm.

5. A group of individuals has been surveyed on the number of hours devoted each day to sleeping and watching TV. The responses are summarized in the following table:

<b>No. of sleeping hours</b>	<b>6</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>10</b>
<b>No. of hours of television</b>	<b>4</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>1</b>

If a person sleeps eight hours, how many hours of TV are they expected to watch?

### Probability Distributions

- 6) Create the samples (hint: Use Sample function for questions a to c)
- Rolling a fair die 3000 times
  - Choose 27 random numbers from 30 to 70
  - Flip a fair coin 1000 times
- 7) Let  $x$  be the normally distributed random variable with mean=0 and standard deviation =30, with  $n=100$
- Plot the probability distribution of  $x$  assuming that the points are normally distributed with mean=0 and standard deviation=30
  - Plot the cumulative distribution points.
  - Input the probability 0.2 and obtain the number whose cumulative value matches this value (hint: `qnorm(0.2, mean=0, sd=30)`)
  - Compute the 50% quantile value using `qnorm` function
- 8) In the above example observe and briefly explain what happens to the normal distribution curve when you change the mean, the variance, or both simultaneously.

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- a. change SD to 15
  - b. change SD to 45
  - c. Change the mean to 50
  - d. Change the mean to -50
- 9) Draw a histogram of 5000 random variables normally distributed with given SD= 5 and mean=20 (hint : use rnorm)
- 10) Calculate the probability that a normally distributed random variable with mean 22 and variance 25
- a. is greater than 29
  - b. is less than 17
  - c. is less than 15 or greater than 25
- 11) If the mean length of a sample of rock cod (a fish variety) is 30 inches and the variance is 4 inches, calculate the approximate probability that a certain rock cod fish is 31 in. long. Calculate the probability using the equation

a) 
$$f(x) = \frac{1}{\sigma\sqrt{2\pi}} \cdot e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$$

Hint:  $1/(\text{sqrt}(2*\pi)*\sigma)*\exp(-((31 - \mu)^2/(2*\sigma^2)))$

b) Verify the same using dnorm() function

Hint: dnorm(31,mu,sigma)

- 12) For the mpg column in mtcars dataset obtain the statistical parameters
- Mean
  - Median
  - Standard Deviation
  - Variance &
  - Range

Marks : All questions carry equal marks.