United Arab Emirates University

STAT 101

Final Exam

30th November, 2023

Name:

Student ID:

- There are a total of 110 points in this Question Paper. Answer as much as you can. If your acquired score is greater than equal to 100 it will be counted as 100%.
- There are three parts in this Exam. Part-I involves TRUE/FALSE or Multiple Answer type questions, Part-II contains a few short answer type questions
- The Exam is scheduled for 120 minutes
- You may take help from the "Exam Assistance Note" containing a few required definitions and formula.

For instructor's use only

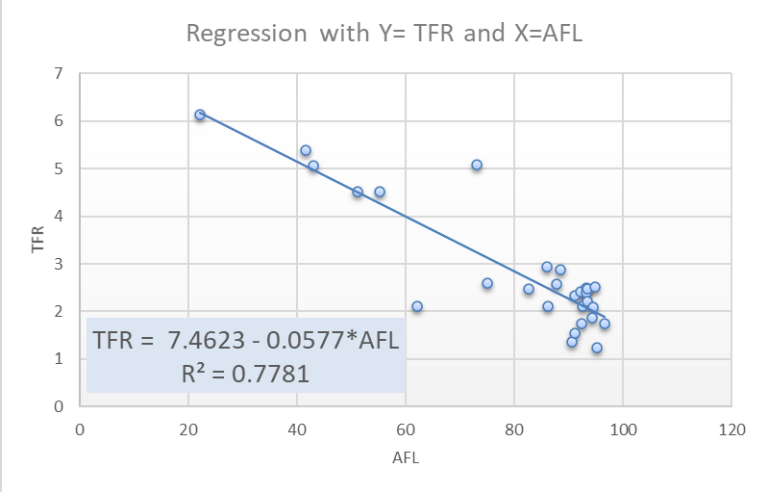
Problem Number	Obtained Score	Total Score
Problem 1		40
Problem 2		20
Problem 3		10
Problem 4		20
Problem 5		20
TOTAL		110
TOTAL(out of 100)		100

You May Use This Page for Rough Work

Part-I

Pick the correct answer option for the questions in this part of the exam.

1. (a) Consider the scatter plot and the corresponding regression line for the 'Adult Female Literacy' (x) and on 'Total Fertility Rate' (y) based on a sample of 30 countries worldwide.



Based on the information provided on the plot, what can we tell about the correlation between the two two variables?

Score:
Total Score: 10

Ans: ☐ 0.882 ☐ -0.882 ☐ 0.7781 ☐ Can not be determined

(b) **Statement:** If correlation between two continuous variables is zero then the there is no relation (no linear or nonlinear relation) between the variables.

Score:
Total Score: 5

Ans: ☐ TURE ☐ FALSE

(c) If there is no linear relationship between two variables, then which value among the options below would be most appropriate about the correlation between the two variables.

Score:
Total Score: 5

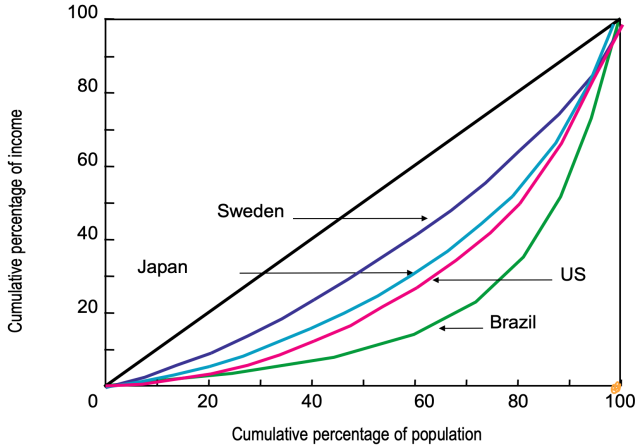
Ans: ☐ 0.957 ☐ 0 ☐ −0.971 ☐ 98.112

(d) According to the World DataBank the **Crude Birth Rate (CBR)** and the **Crude Death Rate** for the entire world in the year 2022 is given as 16.7 (per 1000 population) and 8.9 (per 1000 population). Then what is the world population growth rate (in percentages) **AGR**% in the year 2021?

Score:
Total Score: 5

Ans: ☐ 78.00% ☐ 7.20% ☐ 0.78% ☐ 0.078%

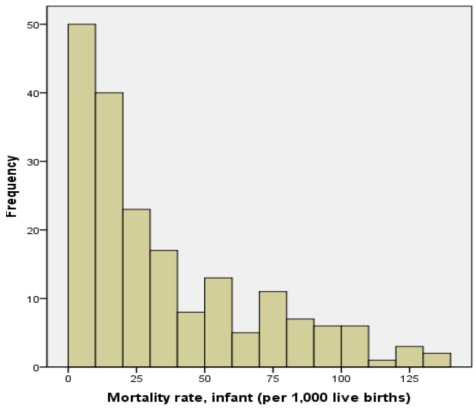
(e) Consider the Lorenz curves of wealth inequality for Japan and USA. Based on the plot below, which country has least wealth inequality among the four?



Score:
Total Score: 5

Ans:
- Japan
- USA
- Sweden
- Brazil

(f) Consider the histogram of 'Infant Mortality Rate'



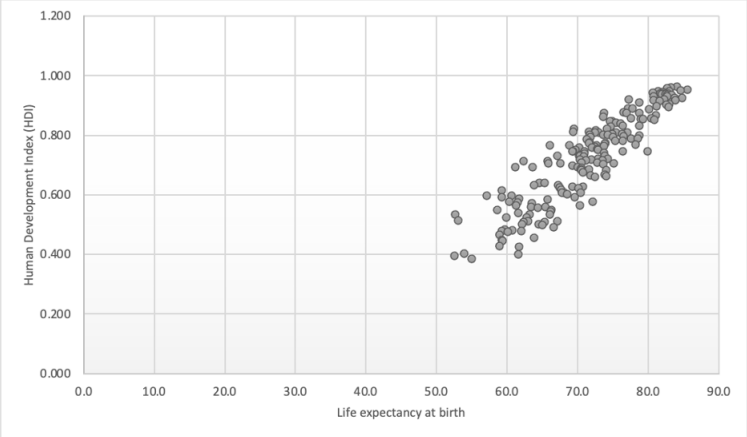
Based on the provided histogram, what can we say about the type of the histogram of the variable? There may be more than one correct option. Select all that are correct.

Score:
Total Score: 5

Ans:
- Skewed Right
- Skewed Left
- Mean is smaller than Median
- Mean is larger than Median

(g)

Consider the scatter plot of the variables 'Life Expectancy at Birth' (LEB), and 'Human Development Index' (HDI) for 191 randomly selected countries.



Based on the provided scatter plot what can we say regarding the nature of association between the variables LEB, and HDI. There may be more then one correct statements, select all the correct options.

Score: _____
Total Score: 5

Ans:

- [ ] There is a negative linear relationship between 'LEB' and 'HDI'
- [ ] There is a negative linear relationship between 'LEB' and 'HDI'
- [ ] As 'LEB' increases, 'HDI' decreases
- [ ] As 'LEB' increases, 'HDI' increases
- [ ] There is no relationship between 'LEB' and 'HDI'.

Part-II

Answer the following short type questions. Show your steps to get full credit.

2. (a) The population of UAE was 6.988 million in 2008 and 9.441 million in 2022. The calculated AAGR% during the period is 1.0217. **Calculate the Doubling Time (DT) of the UAE population if the AARG% remains same.**

Score:
Total Score: 5

(b) The Adult Female Literacy Rate (%) for a seven selected under developed countries are provided as below:

43.1, 51.2, 55.2, 62.3, 73.1, 75.0, 82.8

What is the median of the above seven numbers?

Score:
Total Score: 5

(c) Calculate Weighted Average

Score:
Total Score: 5

(d) Frequency Distribution Table To histogram

Score:
Total Score: 5

4. Consider the following table on world total population provided on a few years interval from 1980 to 2015

Year	World Population (in billions)
1980	4.44
1990	5.29
2000	6.12
2015	7.34

(a) Find the Average Annual Growth Rate **(AAGR%)** for world population during the period **from 1980 to the year 2015.**

Score: _____
Total Score: 10

(b) **Predict the globalpopulation in the year 2035 using 2015 as the base year.** Assume that the AAGR% for world population remains fixed at the value that you have calculated in part (a) of this problem.

Score: _____
Total Score: 10

4. To Estimate the average life expectancy in **less-Developed countries**, a random sample of 144 less developed countries reveals the following data. Sample size:144, Mean:67.1Standard deviation:28.9
On the other hand, the average life expectancy in Developed countries, a random sample of 144 **developed countries** reveals the following data. Sample size:144, Mean:76Standard deviation:28.9

(a) Compute the 95% confidence interval for the average life expectancy in less-developed countries.

Score:
Total Score: 10

(b) Compute the 95% confidence interval for the average life expectancy in developed countries.

Score:
Total Score: 10

(c) Explain whether there is a difference in the life expectancy between less developed and developed countries.

Score:
Total Score: 10

5. The following table is a hypothetical population of 100 individuals with a maximum life span of 4 years, using the remaining life expectancy method:

x	l_x	d_x
0	100	25
1		10
2		25
3		40
4		0

(a) Complete the following table corresponding o the Remaining Life Expectancy.

Score: _____
Total Score: 10

x	l_x	d_x	L_x	T_x	e_x
0	100	25			
1		10			
2		25			
3		40			
4		0			

(b) What is the life expectancy at birth of this hypothetical population?

Score: _____
Total Score: 5

5. Consider an example of the income distribution given by.

	Income %
Income share held by lowest 20%	10
Income share held by second 20%	15
Income share held by third 20%	20
Income share held by fourth 20%	25
Income share held by highest 20%	30

(a) Compute the table with the cumulative percentages of Income Share ans the corresponding cumulative percentages of population and complete the Table Below

Score: ____
Total Score: 10

Cumulative Population %	Cumulative % Income

(b) Plot the Lorenz curve of this hypothetical country.

Score: ____
Total Score: 5

(c) Compute the Gini's Index using the table provided above.

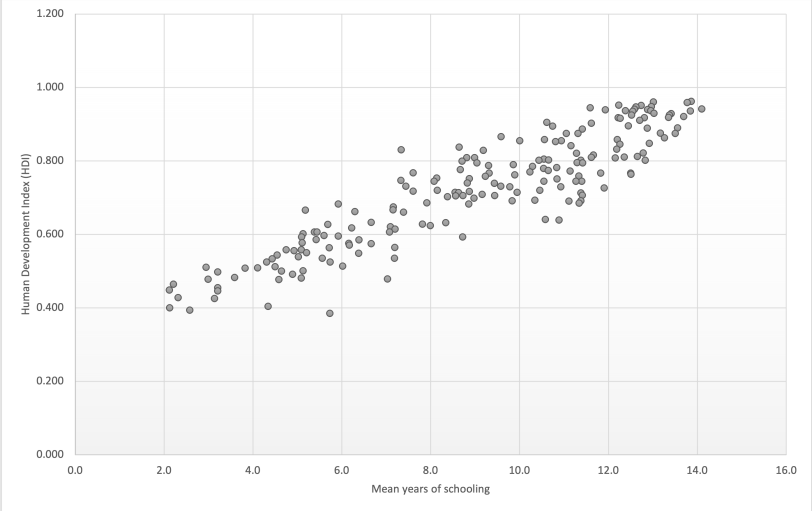
Score:
Total Score: 5

Decile	f_i	x_i	y_i	$(y_i + y_{i-1})$	$f_i \times (y_i + y_{i-1})$
20	20	10			
40	20	15			
60	20	20			
80	20	25			
100	20	30			
				Total	

Here y_i denotes the cumulative income share that you have computed in the previous part of the problem.

$G =$

5. Consider a data set containing two continuous variables, 'Mean years of schooling' and 'Human Development Index' (HDI) of a sample of 192 countries. For a regression model 'Human Development Index' is considered to be the response variable (Y) while the corresponding 'Mean years of schooling' (X) is used as a covariate/independent variable. The following is the scatter plot of the two variables.



Based on the data, the following summary of the variables are obtained:

	Mean years of schooling	**Human Development Index (HDI)**
Sample Mean	$\bar{X} = 8.99$	$\bar{Y} = 0.72$
Sample Standard Deviation	$S_X = 3.17$	$S_Y = 0.15$

Correlation between the variables	$r_{XY} = 0.9091$

Finally we consider a simple linear regression model: $\hat{Y} = a + bX$ where a and b denotes the intercept and the slope correspondingly. Based on the information provided, answer the following questions:

(a) Compute the value of the **slope** and provide its **interpretation**.

Score:
Total Score: 5

(b) Compute the value of the intercept and provide its interpretation. Is the interpretation meaningful in the context of the current example?

Score:
Total Score: 5

(c) Based on the computed regression equation, predict the 'Human Development Index' of a country for which the corresponding 'Mean years of schooling' is 10.

Score:
Total Score: 5