**NATIONAL OPEN UNIVERSITY OF NIGERIA**
**FACULTY OF SOCIAL SCIENCES**
**DEPARTMENT OF ECONOMICS**
**2021_1 EXAMINATION**

**COURSE TITLE: APPLIED QUANTITATIVE ANALYSIS**
**COURSE CODE: ECO 729**
**UNITS: 2**
**TIME ALLOWED: 3 HOURS**
**INSTRUCTION: ANSWER QUESTION (ONE) AND ANY OTHER (TWO) QUESTIONS**

**Question 1**

a) What is a forecast error? **(6 marks)**

b) Given two hypothetical forecasting methods, 1 and 2 in the table below with actual demand and forecast years.

| | | Hypothetical Forecasting Method 1 | | | Hypothetical Forecasting Method 2 | | |
|---|---|---|---|---|---|---|---|
| | Actual | | Forecast | Absolute | | Forecast | Absolute |
| | Demand | Forecast | Error | Deviation | Forecast | | |
| Year | At | Ft | | | Ft | | |
| 1 | 310 | 315 | | | 370 | | |
| 2 | 365 | 375 | | | 455 | | |
| 3 | 395 | 390 | | | 305 | | |
| 4 | 415 | 405 | | | 535 | | |
| 5 | 450 | 435 | | | 390 | | |
| 6 | 465 | 480 | | | 345 | | |

i. Calculate the forecast error for each forecasting method **(8 marks)**
ii. Calculate the absolute deviation each forecasting method **(8 marks)**
iii. Calculate the Mean Absolute Deviation (MAD) each forecasting method **(8 marks)**

**Question 2**

a) The Table below shows the correlation between the existing PMS and Organisational Climate

| | | | | | |
|---|---|---|---|---|---|
| X | 3 | 21 | 18 | 64 | 14 |
| Y | 14 | 67 | 32 | 5 | 2 |

Use the simple correlation (r) method to find if there is strong correlation between the Existing PMS and Organisational Climate **(12 marks)**

b) Briefly discuss the key differences between qualitative and quantitative research **(8 marks)**

**Question 3**

a) Why are moving averages useful **(8 marks)**

b) Storage shed sales at Wallace Garden Supply are shown in the Table below, use a 3-month moving average to forecast for the next January **(12 marks)**

| **Month** | **Actual Shed Sales** |
|---|---|
| January | 10 |
| February | 12 |
| March | 13 |
| April | 16 |
| May | 19 |
| June | 23 |
| July | 26 |
| August | 30 |
| September | 28 |
| October | 18 |
| November | 16 |
| December | 14 |
| January | - |

**Question 4**

a) List and explain the basic properties of a linear program **(8 marks)**

b) **Given a Simplex Method**

Let labour = L, Physical Capital = PC and Technology =T

The objective function is categorized as:

$Maximize\ profit = 200p + 300q$

$$\begin{aligned} subject\ to \quad & \frac{3}{2}p + 2q \le 2,400 \quad (labour\ available) \\ & p + 3q \le 2,400 \quad (Physical\ Capital\ required) \\ & p \le 1,200 \quad (Technology\ \text{Re}quired) \\ & p, q \ge 0 \quad (Non-negativity\ Constraint) \end{aligned}$$

Present this problem in the initial tableau and find the column with the largest negative indicator on the bottom row. (note what is required is only step 1 and 2) **(12 marks)**