FCIS – Ain Shams University
Subject: (CIS240)
Statistical Analysis
Exam: (Mid-Term) 09/12/2020
Year: (2nd year) undergraduate

Examiners: Prof. Dr. Mohamed El-Sharkawy
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Offering Dept.: Basic Sciences
Academic year: 1st term 2020-2021
Duration: 45 Minutes

Version (A) – MODEL ANSWER

Answer the following THREE questions: **(Total Marks: 15)**

Question 1: marks: 5

a) **(3 marks)** Dieticians إخصائي التغذية are concerned about sugar consumption in teenagers' diets (a 12-ounce can of soft drink typically has 10 teaspoons of sugar). In a random sample of 55 students, the number of teaspoons of sugar consumed for each student on a randomly selected day is tabulated. Summary statistics are noted as: **Min = 10, Max = 60, First quartile = 25, Third quartile = 38, Median = 31, Mean = 31.4, n = 55, and S = 11.6,**

i. Find the interquartile range.
IQR = Q3 – Q1 = 38 – 25 = 13

ii. What is the shape of distribution?
Positive or (Right) Skewing

iii. What could you conclude about the value of 60?
Q1-1.5(IQR) = 25 – 1.5(13) = 5.5
Q3+1.5(IQR) = 38 + 1.5(13) = 57.5
Sinc 60 >57.5 → 60 is an outlier.

b) **(2 marks)** Suppose the average score on a national test is 500 with a standard deviation of 100. If each score is increased by 25, what are the new mean and standard deviation?

$\mu_1 = 500$, $\sigma_1 = 100$
After increasing the score by 25 → $\mu_2 = 525$, $\sigma_2 = \sigma_1 = 500$

Question 2: marks: 5

A recent study noted prices in US Dollars and battery lives in hours of 10 top-selling tablet computers. The data follow:

	1	2	3	4	5	6	7	8	9	10
Cost (X)	303	450	260	480	540	390	350	400	600	450
Battery Life (Y)	8.5	10	7	11	10	9	8	9.5	11	9.5

a) **(3 mark)** Calculate the correlation coefficient between the cost of tablets and their battery lives and **Comment** on its value. **($\bar{x}$ = 422.3, $\bar{y}$ = 9.35, S_x= 104.1559, S_y= 1.2704).**

X	303	450	260	480	540	390	350	400	600	450	
Zx	-1.1454	0.26595	-1.5582	0.55398	1.13004	-0.3101	-0.6942	-0.2141	1.7061	0.26595	
Y	8.5	10	7	11	10	9	8	9.5	11	9.5	
Zy	-0.6691	0.51165	-1.8498	1.2988	0.51165	-0.2755	-1.0627	0.11807	1.2988	0.11807	
Zx*Zy	0.766364	0.136072	2.882452	0.719508	0.578183	0.085437	0.73765	-0.02528	2.21588	0.0314	∑ Zx*Zy
											8.127666
											0.9031

r = $\frac{\sum Zx * Zy}{n-1}$ = $\frac{-8.127666}{9}$ = 0.9031, It is a STRONG POSITIVE OR DIRECT Relation

b) **(2 mark)** What would be the error in the predicted value of the battery life for a tablet that costs 350 UD Dollars?

$$\hat{y} = bo + b1\,X$$

$b_1 = r\frac{Sy}{Sx} = 0.9031\,\frac{1.2704}{104.1559}$ = **0.011,** $b_o = \bar{y} - b_1\,\bar{x}$ = 9.35 - (0.011)(422.3) = **4.7407**

$\hat{y} = bo + b1\,X$ = $\hat{y} = 4.7407 + 0.011\,X$

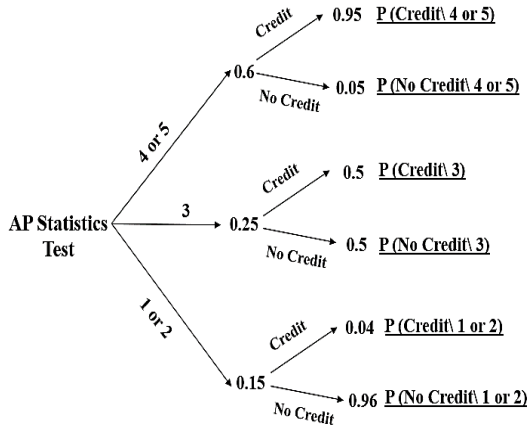
At X = 350 $\hat{y} = 4.7407 + 0.011\,(350)$ = **8.5547**

Error = |8.5547 – 8| = 0.5547

Question 3: **marks: 5**

Suppose that 60% of students who take the AP Statistics exam score 4 or 5, 25% score 3, and the rest score 1 or 2. Suppose further that 95% of those scoring 4 or 5 receive college credit, 50% of those scoring 3 receive such credit, and 4% of those scoring 1 or 2 receive credit.

a) **(3 mark)** What is the probability that a student will get a college credit?



P (Credit) = P (Credit ∩ 4 or 5) + P (Credit ∩ 3) + P (Credit ∩ 1 or 2)

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P (Credit) = (0.95) (0.6) + (0.5) (0.25) + (0.04) (0.15) = **0.701**

b) **(2 mark)** If a student who is chosen at random from among those taking the exam receives college credit, what is the probability that she received a 3 on the exam?

P(3 \ Credit) = $\frac{P\,(Credit\,\backslash 3)\,P(3)}{P\,(Credit)}$ = $\frac{(0.5)\,(0.25)}{0.701}$ = **0.178**

With My Best Regards,
Prof. Dr. Mohamed El-Sharkawy
Dr. Mahmoud Mounir