Question 1

Live streaming platforms have become a crucial driver of modern e-commerce, offering real-time interaction and immersive shopping experiences that help businesses enhance brand influence and boost sales.

A. How can businesses of different sizes leverage live streaming platforms to enhance their competitiveness? Provide examples to illustrate your answer. (10%)
B. How can emerging technologies (e.g., artificial intelligence or virtual reality) further enhance the commercial value of live streaming platforms? (10%)

Question 2

Information technology (IT) has emerged as a pivotal driver of modern business operations, delivering numerous benefits such as increased efficiency, improved decision-making, and enhanced innovation. Consequently, firms across various industries continually invest in IT to secure a competitive edge. However, identical IT investments can result in varying impacts on organizational performance from one firm to another.

A. Discuss the factors that contribute to these differences. (15%)
B. Use examples or theoretical frameworks to explain why similar IT investments may produce divergent outcomes in terms of productivity, profitability, or competitive positioning. (15%)

Question 3

User stories and use cases are tools used in software development and requirements gathering. Compare and contrast their definitions and important characteristics. (15%)

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Question 4

Amy analyzes the factors that determine how much garbage a family produces per week. Factors including the size of the house, the number of children, and the number of adults who are usually home during the day are considered. Below is the report produced by a regression routine. Answer the following questions. You should provide reasoning and justifications for your solution.

(1) Compute the value of adjusted R-squared (UNK1) based on available information. (5%)

(2) Compute the residual degree of freedom (UNK2) and the t-value of the Intercept (UNK3) based on available information. (4%)

(3) Conduct the following hypothesis test (using 95% significance level):

H0: Coefficients of all independent variables are jointly zero.

H1: At least one independent variable has a non-zero coefficient. (6%)

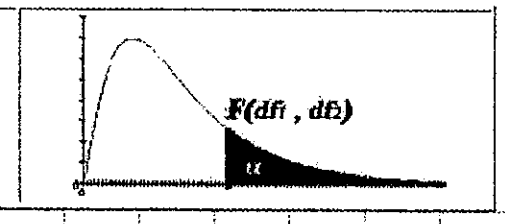
OLS Regression Results

Dep. Variable:	Garbage	R-squared:	0.170
Model:	OLS	Adj. R-squared:	[UNK1]
Method:	Least Squares	F-statistic:	29.80
Date:	Thu, 18 Jun 2070	Prob (F-statistic):	1.52e-17
Time:	16:28:57	Log-Likelihood:	-1194.7
No. Observations:	440	AIC:	2397.
Df Residuals:	[UNK2]	BIC:	2414.
Df Model:	3		
Covariance Type:	nonrobust		

	coef	std err	t	P>|t|	[0.025	0.975]
Intercept	7.1943	1.092	[UNK3]	0.000	———	———
Q("House Size")	0.0019	0.001	——	0.001	0.001	0.003
Children	1.1028	0.141	——	0.000	0.826	1.379
Adults	1.0425	0.233	——	0.000	0.585	1.500

Omnibus:	0.193	Durbin-Watson:	1.963
Prob(Omnibus):	0.908	Jarque-Bera (JB):	0.272
Skew:	0.044	Prob(JB):	0.873
Kurtosis:	2.916	Cond. No.	1.14e+04

F Table for $\alpha = 0.05$



/	df_1=1	2	3	4	5	6	7	8	9	10	12	15	20	24	30	40	60	120	∞
df_2=1	161.4476	199.5000	215.7073	224.5832	230.1619	233.9860	236.7684	238.8827	240.5433	241.8817	243.9060	245.9499	248.0131	249.0518	250.0951	251.1432	252.1957	253.2529	254.3144
2	18.5128	19.0000	19.1643	19.2468	19.2964	19.3295	19.3532	19.3710	19.3848	19.3959	19.4125	19.4291	19.4458	19.4541	19.4624	19.4707	19.4791	19.4874	19.4957
3	10.1280	9.5521	9.2766	9.1172	9.0135	8.9406	8.8867	8.8452	8.8123	8.7855	8.7446	8.7029	8.6602	8.6385	8.6166	8.5944	8.5720	8.5494	8.5264
4	7.7086	6.9443	6.5914	6.3882	6.2561	6.1631	6.0942	6.0410	5.9988	5.9644	5.9117	5.8578	5.8025	5.7744	5.7459	5.7170	5.6877	5.6581	5.6281
5	6.6079	5.7861	5.4095	5.1922	5.0503	4.9503	4.8759	4.8183	4.7725	4.7351	4.6777	4.6188	4.5581	4.5272	4.4957	4.4638	4.4314	4.3985	4.3650
...																			
40	4.0847	3.2317	2.8387	2.6060	2.4495	2.3359	2.2490	2.1802	2.1240	2.0772	2.0035	1.9245	1.8389	1.7929	1.7444	1.6928	1.6373	1.5766	1.5089
60	4.0012	3.1504	2.7581	2.5252	2.3683	2.2541	2.1665	2.0970	2.0401	1.9926	1.9174	1.8364	1.7480	1.7001	1.6491	1.5943	1.5343	1.4673	1.3893
120	3.9201	3.0718	2.6802	2.4472	2.2899	2.1750	2.0868	2.0164	1.9588	1.9105	1.8337	1.7505	1.6587	1.6084	1.5543	1.4952	1.4290	1.3519	1.2539
∞	3.8415	2.9957	2.6049	2.3719	2.2141	2.0986	2.0096	1.9384	1.8799	1.8307	1.7522	1.6664	1.5705	1.5173	1.4591	1.3940	1.3180	1.2214	1.0000

接次頁

Question 5

Let $Y_1, Y_2, \ldots, Y_T$ be an identical and independent sample from population Ω with mean μ and variance σ^2. T is a multiple of 5. Define estimator m as:

$$m = \frac{\sum_{i=1}^{T} g(i) Y_i}{\sum_{i=1}^{T} g(i)},$$

where $g(i) \equiv 1 + (i \bmod 5)$ and mod is the modular operator.

(1) Prove that m is an unbiased estimator for μ. (10%)
(2) What is the variance of m? (10%)

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