JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY
SCHOOL OF HEALTH SCIENCES
UNIVERSITY EXAMINATION FOR DEGREE OF MASTER PUBLIC HEALTH
SPECIAL EXAMINATIONS NOV. 2020

COURSE CODE:	**HES 5123**
COURSE TITLE:	**Advanced Biostatistics**
EXAM VENUE:	**STREAM:**
DATE:	**EXAM SESSION:**
TIME:	**3.00 HOURS**

Instructions:

1. Answer FOUR (4) questions; **Question 1 is compulsory**.
2. Candidates are advised not to write on the question paper.
3. Candidates must hand in their answer booklets to the invigilator while in the examination room.
4. All questions carry 15 marks each.

QUESTIONS

Q1: Design a public health research project of your choice and use it to answer the following questions.

a) Describe one sampling procedure you would use to select items or subjects to include in your research project so as to minimize bias.
b) Construct an appropriate null hypothesis for your research question.
c) Identify an appropriate statistical test for the hypothesis in part b) above.
d) Briefly explain why the statistical test you have identified is appropriate for testing the hypothesis in part b) above is appropriate.

Q2. The SPSS output below represents results of a study conducted by J. K. Silver and D. D. Aiello on "Polio Survivors: Falls and Subsequent Injuries. Use the output to answer the following questions

a) Construct a specific objective and its corresponding null hypothesis for the study in question.
b) Outline the data entry and analysis steps that were used to generate the output.
c) Identify the categorical variables in the study.
d) Identify the kind of chi-square that yielded the results in the output.
e) Explain the policy recommendations of the results.

Case Processing Summary

	Cases					
	Valid		Missing		Total	
	N	Percent	N	Percent	N	Percent
polio_outcome * liefstylechange	223	100.0%	0	.0%	223	100.0%

polio_outcome * liefstylechange Crosstabulation

			liefstylechange		
			YES (Changed Lifestyle)	NO (DID not Change Lifestyle)	Total
polio_outcome	Fallers	Count	131	52	183
		Expected Count	119.0	64.0	183.0
	Nonfallers	Count	14	26	40
		Expected Count	26.0	14.0	40.0
Total		Count	145	78	223
		Expected Count	145.0	78.0	223.0

Chi-Square Tests

	Value	df	Asymp. Sig. (2-sided)	Exact Sig. (2-sided)	Exact Sig. (1-sided)
Pearson Chi-Square	19.318[a]	1	.000		
Continuity Correction[b]	17.742	1	.000		
Likelihood Ratio	18.463	1	.000		
Fisher's Exact Test				.000	.000
Linear-by-Linear Association	19.231	1	.000		
N of Valid Cases	223				

a. 0 cells (.0%) have expected count less than 5. The minimum expected count is 13.99.

b. Computed only for a 2x2 table

Q3: A nutritionist carried out a study to determine whether body weight predicted blood glucose levels. Use the output below to answer the following questions

a) Identify the statistical test that yielded the results shown in the output.
b) Identify the number of participants in the study.
c) Outline the SPSS steps that were taken to yield the results in the output.
d) State the equation that represents the relatiosnhip between body weight and blood sugar levels.
e) State whether there is adequate evidence to conlude that body weight predicts blood glucose level.

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.484[a]	.234	.180	9.27608

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.484[a]	.234	.180	9.27608

a. Predictors: (Constant), Body Weight

ANOVA[b]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	368.798	1	368.798	4.286	.057[a]
	Residual	1204.639	14	86.046		
	Total	1573.437	15			

a. Predictors: (Constant), Body Weight

b. Dependent Variable: blood glucose

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	61.877	19.189		3.225	.006
	Body Weight	.510	.246	.484	2.070	.057

a. Dependent Variable: blood glucose

Q4. Use the output below to answer the following questions.

a) Briefly explain why the paired t-test was the appropriate statistical test.
b) State the null hypothesis that was tested.
c) Outline the data entry and analysis steps that were followed to produce the output.
d) State the correct interpretation of the results.
e) Make recommendations to an relevant stakeholder based on your interpretation in part d) above.

Paired Samples Statistics

		Mean	N	Std. Deviation	Std. Error Mean
Pair 1	BMI_before	17.86	51	5.671	.794
	BMI_after	18.78	51	4.026	.564

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
					95% Confidence Interval of the Difference				
		Mean	Std. Deviation	Std. Error Mean	Lower	Upper			
Pair 1	BMI_before - BMI_after	-.922	4.265	.597	-2.121	.278	-1.543	50	.129

Q5: Design a public health or biomedical reresearch topic of your choice for which logistic regression is an appropriate statistical test. Use your thought-research project to answer the following questions

a) State the null hypothesis that you will test.
b) Briefly discuss an appropriate sampling procedures that you will employ.
c) State three assumptions of the binary logistric regression.
d) Describe the data entry and analysis steps that you will use to analyze the generated data.

Q6: Use the output below to answer the following questions.

a) Identify the dependent and independent variables.
b) State the null hypothesis that was tested.
c) Briefly explain why the K-S test and Levene's test for equality of variance were performed.
d) Briefly explain why multiple comparisons were performed.
e) Interpret the ouput as completely as possible.

One-Sample Kolmogorov-Smirnov Test

		plaque
N		86
Normal Parameters[a.,b]	Mean	2.0562
	Std. Deviation	.55462
Most Extreme Differences	Absolute	.134
	Positive	.110
	Negative	-.134
Kolmogorov-Smirnov Z		1.243
Asymp. Sig. (2-tailed)		.091

a. Test distribution is Normal.

b. Calculated from data.

Test of Homogeneity of Variances

plaque

Levene Statistic	df1	df2	Sig.
7.742	2	83	.001

ANOVA

plaque

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	6.146	2	3.073	12.754	.000
Within Groups	20.000	83	.241		
Total	26.146	85			

Post Hoc Tests

Multiple Comparisons

plaque
LSD

(I) patient_category	(J) patient_category	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
Patients in dialysis for less than 1 year	Patients in dialysis for 1-3 years	-.46429*	.12899	.001	-.7208	-.2077
	Patients in dialysis for more than 3 years	-.64036*	.13119	.000	-.9013	-.3794
Patients in dialysis for 1-3 years	Patients in dialysis for less than 1 year	.46429*	.12899	.001	.2077	.7208
	Patients in dialysis for more than 3 years	-.17607	.12899	.176	-.4326	.0805
Patients in dialysis for more than 3 years	Patients in dialysis for less than 1 year	.64036*	.13119	.000	.3794	.9013
	Patients in dialysis for 1-3 years	.17607	.12899	.176	-.0805	.4326

*. The mean difference is significant at the 0.05 level.