UNIVERSITY OF ESWATINI

FACULTY OF EDUCATION

DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND

MANAGEMENT   2021

FIRST SEMESTER RE-SIT EXAMINATION PAPER

JULY, 2021

TITLE OF PAPER: INTRODUCTION TO EDUCATIONAL RESEARCH

COURSE CODE: EFM 515

TIME ALLOWED: Three (3) hours

INSTRUCTIONS   :   1. THIS PAPER IS DIVIDED INTO **TWO SECTIONS (A AND B). ANSWER ANY TWO** QUESTIONS FROM EACH SECTION
2. UTILISE THE ATTACHED STATISTICAL FORMULAS AND TABLES WHERE NECESSARY.

TOTAL MARKS   :   100

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SECTION A

Answer any two questions in this section.

Question 1

   (a) List five major components of a research report.   (5 marks)

   (b) Give six reasons why a research proposal is necessary in educational research.

             (20 marks)

            [Total 25 marks]

Question 2

Examine four non-probability sampling techniques and explain when each one may be used in educational research.   [Total 25 marks]

Question 3

Discuss six features of ethnographic research and its suitability for educational research in secondary schools in Eswatini.   [Total 25 marks]

SECTION B

Answer any two questions in this section.

Question 4

Table 1 below shows the marks which were obtained by Form 3 pupils in Mathematics and Science end of year examinations.

Table 1:

Mathematics and Science Marks

PUPIL	A	B	C	D	E	F	G	H	I	J
Maths Mark	80	60	72	47	62	75	64	58	72	70
Science Mark	78	61	70	52	60	75	65	60	70	70

   a) Calculate the mean of Mathematics   (4 marks)

   b) State the Mode of Science marks   (2 mark)

   c) Find the median of Science marks   (3 marks)

   d) Compute the Standard deviation of Mathematics marks and comment on it(12 marks)

   e) State any 2 disadvantages of the mean   (4 marks)

Question 5

Table 2:

Time spent studying and performance during examination

Student	Q	R	S	T	U	V	W	X	Y	Z
Time Hours (x)	22	26	20	19	27	24	25	23	18	20
Examination score (y)	74	74	69	68	73	71	72	69	65	66

Using information from table 2 above calculate Pearson's product moment correlation co-efficient and comment on it.   [Total 25 marks]

Question 6

Two lecturers conducted an interview for prospective students and awarded them marks as follows;

Student	A	B	C	D	E	F	G	H	I	J
Lecturer x	50	48	52	70	70	72	55	70	80	72
Lecturer y	45	44	60	66	80	60	40	68	84	72

Carry out a t-test at 0,05 significance level the hypothesis that there is no significant difference in how they awarded marks using a t-test by;

i)   Stating the null and alternative hypothesis   (2 marks)
ii)   Calculating the degrees of freedom   (1 mark)
iii)   Stating the rejection criteria   (1 mark)
iv)   Conducting the test   (19 marks)
v)   Stating the conclusion   (2 marks)

TABLE II Critical Values of t Student t-test

df	Level of significance for directional (one-tailed) test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for non-directional (two-tailed) test					
	.20	.10	.05	.02	.01	.001
1	3.08	6.314	12.706	31.721	63.657	636.619
2	1.886	2.920	4.303	6.965	9.925	31.598
3	1.638	2.353	3.182	4.541	5.841	12.941
4	1.533	2.132	2.776	3.747	4.604	8.610
5	1.476	2.015	2.571	3.365	4.032	6.859
6	1.440	1.943	2.447	3.143	3.707	5.959
7	1.415	1.895	2.365	2.998	3.499	5.405
8	1.397	1.860	2.306	2.896	3.355	5.041
9	1.383	1.833	2.262	2.821	3.250	4.781
10	1.372	1.812	2.228	2.764	3.169	4.587
11	1.363	1.796	2.201	2.718	3.106	4.437
12	1.356	1.782	2.179	2.681	3.055	4.318
13	1.350	1.771	2.160	2.650	3.012	4.221
14	1.345	1.761	2.145	2.624	2.977	4.140
15	1.341	1.753	2.131	2.602	2.947	4.073
16	1.337	1.746	2.120	2.583	2.921	4.015
17	1.333	1.740	2.110	2.567	2.898	3.965
18	1.330	1.734	2.101	2.552	2.878	3.922
19	1.328	1.729	2.093	2.539	2.861	3.883
20	1.325	1.725	2.086	2.528	2.845	3.850
21	1.323	1.721	2.080	2.518	2.831	3.819
22	1.321	1.717	2.074	2.508	2.819	3.792
23	1.319	1.714	2.069	2.500	2.807	3.767
24	1.318	1.711	2.064	2.492	2.797	3.745
25	1.316	1.708	2.060	2.485	2.787	3.725
26	1.315	1.706	2.056	2.479	2.779	3.707
27	1.314	1.703	2.052	2.473	2.771	3.690
28	1.313	1.701	2.048	2.467	2.763	3.674
29	1.311	1.699	2.045	2.462	2.756	3.659
30	1.310	1.697	2.042	2.457	2.750	3.646
40	1.303	1.684	2.021	2.423	2.704	3.551
60	1.296	1.671	2.000	2.390	2.660	3.460
120	1.289	1.658	1.980	2.358	2.617	3.373
∞	1.282	1.645	1.960	2.326	2.576	3.291

Find the row corresponding to the indicated degrees of freedom, find the column corresponding to the chosen level of significance, taking into account the type of H_1 (directional or non-directional). The critical value t_{cv} is the intersection of that row and that column. If $t_{obs} > t_{cv}$ then H_0 is rejected.

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STATISTICAL FORMULAE

Sample Variance: $\qquad\qquad\qquad\qquad S^2 = \frac{\sum(x-\bar{x})^2}{n-1}$

Sample Standard Deviation: $\qquad\qquad s = \sqrt{\frac{\sum(x-\bar{x})^2}{n-1}}$

Pearson product moment correlation coefficient:

$$r_{xy} = \frac{n\sum xy - \sum x \sum y}{\sqrt{[n\sum x^2 - (\sum x)^2][n\sum y^2 - (\sum y)^2]}}$$

Spearman's rank order correlation coefficient: $\qquad rho = 1 - \frac{6\sum d^2}{n(n^2-1)}$

Chi-squared Test Statistic: $\qquad\qquad\qquad x^2 = \sum \frac{(O-E)^2}{E}$

Z-score: $\qquad\qquad z = \frac{x-\bar{x}}{s}$

Standardisation: $\qquad z = \frac{u-\mu}{\sigma} \qquad$ Where $Z \sim N(0,1)$

T-score: $\qquad\qquad T = 50 + 10\left(\frac{x-\bar{x}}{s}\right)$

Student t-test: $\qquad\quad t = \frac{\sqrt{(n-1)}\sum d}{\sqrt{n\sum d^2 - (\sum d)^2}}$

ANALYSIS OF VARIANCE (ANOVA) FORMULAE

1. $SS \text{ (TOTAL)} = \sum x^2 - \dfrac{(\sum x)^2}{n}$

2. $SST = SS(\text{Treatment}) = SS(BtwnGrps) = \sum \dfrac{T_i^2}{n_i} - \dfrac{(\sum x)^2}{n} = \dfrac{T_1^2}{n_1} + \dfrac{T_2^2}{n_2} + \cdots + \dfrac{T_p^2}{n_p} - $

   $\dfrac{(\sum x)^2}{n}$

3. $SSE = SS \ (TOTAL) - SST$

   [N.B. $SSE = SS$ (Error) $= SS$ (Within Groups) $= SS$ (Residual)]

4. $MST = \dfrac{SST}{p-1}$

5. $MSE = \dfrac{SSE}{n-p}$

6. $F_{calc} = \dfrac{MST}{MSE}$

ONE-WAY ANOVA TABLE

Source of variation	Sum of squares	Degrees of Freedom (df)	Mean Square	F_{calc}
Between Groups (Treatments)	SST	$p\text{-}1$	$MST = \dfrac{SST}{p-1}$	
Within Groups (Error or Residual)	SSE	$n\text{-}p$	$MSE = \dfrac{SSE}{n-p}$	$F_{calc} = \dfrac{MST}{MSE}$
Total	$SS(\text{TOTAL})$	$n\text{-}1$		

n = total number of observations

p = number of treatments (number of samples or groups)

p-1 = numerator degrees of freedom

n-p = denominator degrees of freedom

T_i= total for group i(i = 1, 2, 3, ..., p)

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n_i = number of observations in group i($i = 1, 2, 3, \ldots, p$)

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