

UNIVERSITY OF SWAZILAND

FACULTY OF EDUCATION



DEPARTMENT OF EDUCATIONAL FOUNDATIONS AND MANAGEMENT

FOR

INSTITUTE OF POST GRADUATE STUDIES

NOVEMBER, 2017 FINAL EXAMINATION PAPER

MASTER OF EDUCATION (M.Ed)

- COURSE CODE : EFM 601/EDF 650
- TITLE OF PAPER : RESEARCH DESIGN AND TECHNIQUES
- TIME ALLOWED : THREE 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

THIS PAPER IS NOT TO BE OPENED UNTIL PERMISSION TO DO SO HAS BEEN GRANTED BY THE INVIGILATOR.

SECTION A

1. Discuss the significance of literature review in a research. *Total: 25 Marks.*
2. Examine the assertion that the qualitative research paradigm is more applicable to educational research than the quantitative paradigm. *Total: 25 Marks.*
3. Evaluate the claim that a research proposal is an indispensable element in educational research. *Total: 25 Marks.*

SECTION B

4. Table 1 below shows 12 pairs of marks from 12 students who sat for two tests X and Y.

Table 1 showing marks obtained by 12 students in test X and test Y

student	A	B	C	D	E	F	G	H	I	J	K	L
Test X	7	8	10	9	12	14	16	11	12	15	13	16
Test Y	16	17	19	21	20	22	23	18	24	25	21	25

- a) Using the appropriate formula calculate the correlation coefficient for the two pairs of scores and comment on it. **(20 marks)**
- b) Calculate the mean of test X **(2 marks)**
- c) Calculate the median of test Y **(2 marks)**
- d) State the mode of test X **(1 mark)**

[Total 25 marks]

5. The table below shows marks obtained by 10 students in Science and Mathematics

Table 2 showing results obtained in Science and Mathematics

Student	A	B	C	D	E	F	G	H	I	J
Science	90	80	20	60	85	20	50	45	55	65
Maths	80	70	30	50	70	20	40	40	50	80

- a). Draw a scatter plot and comment on it. **(5 marks)**
- b). Calculate the standard deviations for Science and Maths. **(20 marks)**

[Total: 25 marks]

6. Ten Form 4 pupils at a certain school wrote two tests; one in Geography and the other one in History. Table 3 below shows the results

Table 3 showing results of 10 pupils in Geography and History

Pupil	Geography	History
A	80	40
B	74	52
C	56	75
D	52	74
E	78	50
F	90	54
G	73	59
H	65	60
I	40	71
J	75	48

Carry out a t- test at 1% significance level to determine if there is a difference between the Form 4 pupils' academic performance in Geography and History and comment on the obtained t.

[25 marks]

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STATISTICAL FORMULAE

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

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

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: $rho = 1 - \frac{6\sum d^2}{n(n^2-1)}$

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

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

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

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

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

ANALYSIS OF VARIANCE (ANOVA) FORMULAE

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

$$2. \quad SST = SS(\text{Treatment}) = SS(\text{Btwn Grps}) = \sum \frac{T_i^2}{n_i} - \frac{(\sum x)^2}{n} = \frac{T_1^2}{n_1} + \frac{T_2^2}{n_2} + \dots + \frac{T_p^2}{n_p} - \frac{(\sum x)^2}{n}$$

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

[N.B. $SSE = SS(\text{Error}) = SS(\text{Within Groups}) = SS(\text{Residual})$]

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

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

$$6. \quad F_{calc} = \frac{MST}{MSE}$$

ONE-WAY ANOVA TABLE

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

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 ($i = 1, 2, 3, \dots, p$)

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

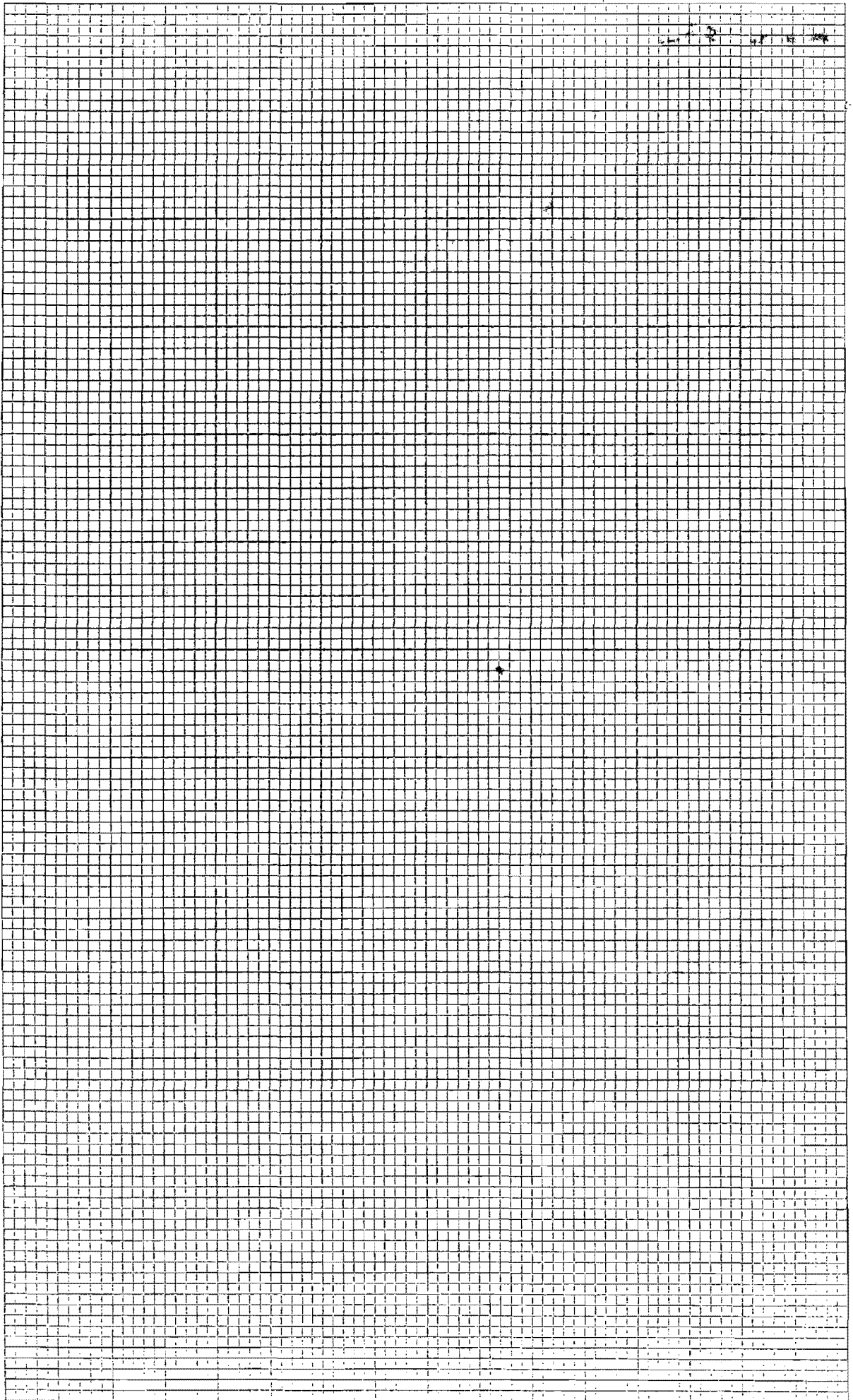


TABLE II Critical Values of *t*: Student *t*-test

df	Level of significance for a directional (one-tailed) test					
	.10	.05	.025	.01	.005	.0005
	Level of significance for a non-directional (two-tailed) test					
	.20	.10	.05	.02	.01	.001
1	3.078	6.314	12.706	31.821	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_{crit} is at the intersection of that row and that column. If $t_{obs} \geq t_{crit}$ then H_0 is rejected.