UNIVERSITY OF SWAZILAND

FACULTY OF HEALTH SCIENCES

FINAL EXAMINATION, MAY 2006

COURSE   : HSC 402

TITLE OF PAPER   : HEALTH SYSTEMS RESEARCH AND
                                STATISTICS

DURATION   :   3 HOURS

MARKS: :   100

INSTRUCTIONS

THIS PAPER HAS TWO SECTIONS NAMELY SECTION A (STATISTICS) AND SECTION B (HEALTH SYSTEMS RESEARCH).

1. **SECTION A (STATISTICS)**: THIS SECTION HAS **FIVE** QUESTIONS. ANSWER ANY **FOUR (4)** QUESTIONS.

2. **REQUIREMENTS:** SCIENTIFIC CALCULATORS. STATISTICAL TABLE PROVIDED.

3. **SECTION B (HEALTH SYSTEMS RESEARCH)**

    ANSWER ALL QUESTIONS IN SECTION B

4. WRITE EACH QUESTION ON A SEPARATE SHEET OF PAPER

DO NOT OPEN THIS PAPER UNTIL PERMISSION HAS BEEN GRANTED BY THE INVIGILATOR.

1

QUESTION ONE

(a) Distinguish between primary and secondary data.

(b) Give two major sources of primary data.

(c) Describe the various methods of collecting primary data on "HEALTH STATUS OF SWAZIS". Comment on their advantages and disadvantages.

(3+2+10)marks

QUESTION TWO

Seven Health Science students were examined in Biostatistics(X) and Biometrics(Y), their marks were given as follows:

| BIOSTATISTICS | 38 | 51 | 19 | 53 | 39 | 38 | 66 |
| BIOMETRICS | 50 | 72 | 36 | 64 | 52 | 56 | 80 |

(a) Fit a regression line of the form $Y = a + bX$ by the Method of Least Squares.

(b) Calculate the product moment correlation coefficient and Rank correlation coefficient

(5+5+5)marks

QUESTION THREE

In its annual report a government hospital claims a total work force of 1600 whose distribution of annual salary(x) is as follows: There are 480 employees earning R2000 or less in contrast with 32 top executives earning in excess of R20000. There are four intermediary salary groups;640 earning over R2000 but not exceeding R5000, 16% of total workforce earning over R5000 but not exceeding R10000,128 employees in the group earning in the range of R10000<x<R15000 and the rest are in a group that earns in the range of R15000<x<R20000.

(i)   Construct the full frequency table.
(ii)   Determine the median and other quartiles.
(iii)   Determine the shape of the distribution

(5+5+5)marks

QUESTION FOUR

The management of a newly created Medical School is in dire need of a synergy of experts in its administration. The school needs no more than four professionals in the administration. For a start, 10 professionals including 4 physicians, 4 medial technologists and 2 health administrators were interviewed, what is the probability that:

(a)   The 4 physicians will be chosen.
(b)   3 medical technologists and 1 health administrator will be chosen.

(c) 2 physicians, 1 medical technologist and 1
     health administrator will be chosen
                              (5+5+5)marks

QUESTION FIVE

(a) The probability that a patient recovers from a
     disease is 0.45. If 17 people are known to have
     contacted this disease, find the probability that:
     (i)   No one survives it
     (ii)   Exactly 8 survive it

                              (3+3) marks

(b) Suppose X is the population of a community
     exposed to a known disease, If X is a normal
     variate with a mean of 30 and a standard
     deviation of 5, find the probability that the number
     of people exposed to the disease is within 26 and
     40, and hence the expected number of people that
     will be exposed if the total population is 1000.
                              (5+4)marks

SECTION B: ANSWER ALL QUESTIONS

QUESTION 1

DIRECTIONS: From the list of alternatives, select the answer that best applies or completes the statement. E.g. 1d

1   Which of the following describes what a problem is?

    a.   Usually a question that needs to be answered
    b   The aim of the study
    c   Direction and focus of the study
    d   Predictor of relationships between two or more variables

2   An excellent source of finding a problem to study is

    a.   daily work
    b   reviewing previous studies
    c   a questioning attitude
    d   an intellectual duriosity

3   In finding a problem for research, which one of the following would best help the nurse researcher the least?

    a   Intellectual curiosity
    b   review of literature
    c   Desire to quickly culminate the research
    d   Excitement of the research

4   A way of getting "started" in identifying a problem for study is to:

    a   raise questions
    b   observe nursing care that is given
    c   observe responses of patients to nursing care
    d   think of clinical situations
    e   do all the above

5   Problem identification in nursing research should involve:

    a   systematic observation
    b   a questioning attitude
    c   intellectual curiosity
    d   all the above

6   Problem identification is:

    a   relatively easy to accomplish
    b   the least time consuming step of the entire research process
    c   *more successfully attained with an intellectual curiosity*
    d   all the above

7   In nursing research, a difficulty with problem identification can be aided by which of the following?

    a   systematic observation
    b   intellectual curiosity
    c   a questioning attitude
    d   Familiarity with the literature

8   A study may be replicated to:

    a   substantiate its findings
    b   refute its findings
    c   study some of the elements in the study
    d   duplicate its methodology
    e   do all the above

9   Which of the following statements about the statement of the problem is not true?

    a   The problem must be researchable
    b   There must be a real need to find an answer to the problem
    c   The problem is the aim of the study
    d   The problem may be one that was previously researched

10   Which statement about the purpose of the study is not true?

    a   Gives direction to the study
    b   Always includes the ultimate reason for the study
    c   Identifies the problem
    d   Gives focus to the study

11   The statement of the purpose is developed primarily to:

    a   Identify the limitations of the study
    b   identify the scope of the study
    c   serve as the focus for the study
    d   narrow the field of the literature
    e   all the above

12   The purpose of the study:

    a   explains the question that needs to be answered
    b   explains an unsatisfactory condition for which a solution is sought
    c   *may predict something related to the problem's solution*
    d   does all of the above

13   The purpose of research is to discover all of the following except:

    a   unknown facts
    b   interpretation of facts
    c   a hypothesis
    d   explanation of facts

14   Rationale for a study often

    a   includes the significance of the study
    b   includes the statement of the problem
    c   culminates in the statement of the of the purpose of the strudy
    d   includes the usefulness of the study
    e   does all of the above

15   The purpose for the search of literature is to:
    a   help clarify the problem
    b   identify and relate previous research in the area of the study
    c   lead logically to the question to be studied
    d   identify the theoretical framework of the research
    e   do all of the above

16   In the search of literature, the nurse researcher may:

    a   locate pertinent data useful for the researcher's study
    b   find comparable data that will be valuable in interpreting the conclusions of the researcher's study
    c   determine if some research has already been done on the researcher's study
    d   find methods used by other s to be useful in the researcher's study
    e   do all of the above

17   The terminal outcome in research is sometimes called:

    a   the dependent variable
    b   the independent variable
    c   the controlled variable
    d   none of the above

18   The variable that is manipulated in an experiment is called the :criterion measure:

    a   dependent variable
    b   criterion variable
    c   experimental variable
    d   controlled variable

19   A pilot study is often helpful because it:

    a   permits a preliminary testing of the hypothesis
    b   provides the researcher with ideas, approaches, and clues not otherwise possible
    c   permits a check of procedures with the possibility of revision where needed
    d   does all of the above

20   A study to test procedures or tools is known as:

    a   pretest study
    b   proposal
    c   pilot study
    d   test-retest
    e   none of the above

21   A study describing the evolution of aseptic technique would be which type of study?

    a   longitudinal
    b   descriptive
    c   historical
    d   evaluative

22   The most powerful research method for establishing causal relationships is the:

    a   experimental method
    b   causal-comparative method
    c   correlational method
    d   descriptive method

23   Reasons for conducting a survey include:
    a   obtaining demographic data
    b   obtaining information about people's behaviour
    c   assessing educational achievement levels
    d   learning about why people purchase certain types of products
    e   all of the above

24   Survey approaches include:
a   case studies
b   comparative
c   *cross sectional*
d   longitudinal
e   all of the above

25   A nurse researcher interested in finding out the results of some procedure or method already in operation is most likely to use which of these survey approaches?
a   comparative survey
b   cross sectional survey
c   evaluation survey
d   None of the above

TOTAL MARKS...**[25]**

QUESTION 2

<u>A</u>   **Define the concept operationalizatoion**...**[1]**

<u>B</u>   **Rephrase the following factors as variables**.............................**[4]**
i)   **long waiting time**
ii)   **absence of drugs**
iii)   **lack of supervision**
iv)   **poor knowledge of the signs, causes and consequences of TB**

C

Read the following article carefully and discuss by way of identifying *sentences* that show if the researcher adhered to the ethical considerations required when conducting studies with human subjects...(20)

TITLE: EATING PATTERNS SUCCESSFUL DIETERS USE TO MAINTAIN WEIHT LOSS

INVESTIGATOR: WENDY CHABOYER
In response to your reply to the advertisement in the **Times of Swaziland** for successful dieters, I am herewith inviting you to participate in a research study on successful dieters. The purpose of the research is to see if there are any common features in the personal histories of successful dieters (weight losers) that can be share with unsuccessful weight losers. Although this study will not benefit you directly, the information obtained may help those who have trouble in losing weight and maintaining weight loss to hear how you and other successful dieters were able to do it. As far as I can tell, there should be no risks or discomforts to you in sharing your own story. Your participation will mean that you will meet me once for an audio taped interview lasting one to one-half hours. You will be requested to provide a photograph of yourself when overweight or a piece of clothing you may have saved and I will ask you to weigh yourself on my calibrated scale and let me measure your height. I will keep a record of who has participated in this study, and will keep the tapes of our conversation interviews together with a transcription of those tapes. Your name will not be on the tape or on the transcription, so that data will not be linked with your name. All data will be stored in a secure place and no one except the research will have access to your interview. Your identity will not be revealed when the study is reported. If you have any questions (WENDY CHABOYER). You may call me at 4040004 work) or 5050005 Home.
Your participation is totally voluntary; you are under no obligation to participate. You have a right to withdraw anytime if you care to, without repercussion or penalty, even in the middle of the interview
The study and procedures has been approved by the Ministry of Health & Social Welfare of Swaziland.
TOTAL MARKS...[25]

Table 5   PERCENTAGE POINTS OF THE STANDARDISED NORMAL DISTRIBUTION

The u_α values tabulated are such that $\Pr(U > u_\alpha) = \alpha$, where $U \sim N(0,1)$
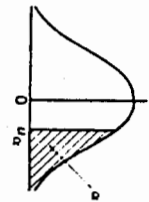
α	u_α	α	u_α	α	u_α	α	u_α
0.50	0.00000	0.34	0.41246	0.18	0.91537	0.025	1.96000
0.49	0.02507	0.33	0.43991	0.17	0.95416	0.020	2.05375
0.48	0.05015	0.32	0.46770	0.16	0.99446	0.010	2.32635
0.47	0.07527	0.31	0.49585	0.15	1.03643	0.009	2.36562
0.46	0.10004	0.30	0.52440	0.14	1.08032	0.008	2.40891
0.45	0.12566	0.29	0.55338	0.13	1.12639	0.007	2.45726
0.44	0.15097	0.28	0.58284	0.12	1.17499	0.006	2.51214
0.43	0.17637	0.27	0.61281	0.11	1.22653	0.005	2.57583
0.42	0.20189	0.26	0.64335	0.10	1.28155	0.004	2.65207
0.41	0.22754	0.25	0.67449	0.09	1.34076	0.003	2.74778
0.40	0.25335	0.24	0.70630	0.08	1.40507	0.002	2.87816
0.39	0.27932	0.23	0.73885	0.07	1.47579	0.001	3.09023
0.38	0.30548	0.22	0.77219	0.06	1.55477	0.0005	3.29053
0.37	0.33185	0.21	0.80642	0.05	1.64485	0.0001	3.71902
0.36	0.35846	0.20	0.84162	0.04	1.75069	0.00005	3.89060
0.35	0.38532	0.19	0.87790	0.03	1.88079	0.00001	4.26489

Table 6   ORDINATES OF THE STANDARDISED NORMAL DISTRIBUTION

The function tabulated is $\phi(u) = \dfrac{1}{\sqrt{2\pi}} e^{-u^2/2}$
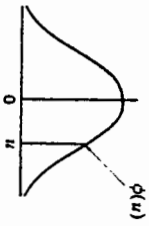
u	0.0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9
0.0	0.39894	0.39695	0.39104	0.38139	0.36827	0.35207	0.33322	0.31225	0.28969	0.26609
1.0	0.24197	0.21785	0.19419	0.17137	0.14973	0.12952	0.11092	0.09405	0.07895	0.06562
2.0	0.05399	0.04398	0.03547	0.02833	0.02239	0.01753	0.01358	0.01042	0.00792	0.00595
3.0	0.00443	0.00327	0.00238	0.00172	0.00123	0.00087	0.00061	0.00042	0.00029	0.00020
4.0	0.00013	0.00009	0.00006	0.00004	0.00002	0.00002	0.00001	0.00001	0.00000	0.00000

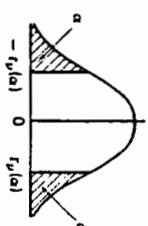**Table 7   PERCENTAGE POINTS OF THE t DISTRIBUTION**

ONE-SIDED TEST
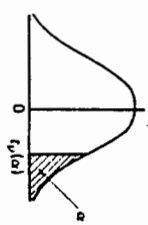
$\Pr(T_\nu > t_\nu(\alpha)) = \alpha$, for ν degrees of freedom.

TWO-SIDED TEST

$\Pr(T_\nu > t_\nu(\alpha)$ or $T_\nu < -t_\nu(\alpha)) = 2\alpha$, for ν degrees of freedom.

ν	α = 0.4, 2α = 0.8	0.25, 0.5	0.1, 0.2	0.05, 0.1	0.025, 0.05	0.01, 0.02	0.005, 0.01	0.0025, 0.005	0.001, 0.002	0.0005, 0.001
1	0.325	1.000	3.078	6.314	12.706	31.821	63.657	127.320	318.310	636.620
2	0.289	0.816	1.886	2.920	4.303	6.965	9.925	14.089	22.327	31.598
3	0.277	0.765	1.638	2.353	3.182	4.541	5.841	7.453	10.214	12.924
4	0.271	0.741	1.533	2.132	2.776	3.747	4.604	5.598	7.173	8.610
5	0.267	0.727	1.476	2.015	2.571	3.365	4.032	4.773	5.893	6.869
6	0.265	0.718	1.440	1.943	2.447	3.143	3.707	4.317	5.208	5.959
7	0.263	0.711	1.415	1.895	2.365	2.998	3.499	4.029	4.785	5.408
8	0.262	0.706	1.397	1.860	2.306	2.896	3.355	3.833	4.501	5.041
9	0.261	0.703	1.383	1.833	2.262	2.821	3.250	3.690	4.297	4.781
10	0.260	0.700	1.372	1.812	2.228	2.764	3.169	3.581	4.144	4.587
11	0.260	0.697	1.363	1.796	2.201	2.718	3.106	3.497	4.025	4.437
12	0.259	0.695	1.356	1.782	2.179	2.681	3.055	3.428	3.930	4.318
13	0.259	0.694	1.350	1.771	2.160	2.650	3.012	3.372	3.852	4.221
14	0.258	0.692	1.345	1.761	2.145	2.624	2.977	3.326	3.787	4.140
15	0.258	0.691	1.341	1.753	2.131	2.602	2.947	3.286	3.733	4.073
16	0.258	0.690	1.337	1.746	2.120	2.583	2.921	3.252	3.686	4.015
17	0.257	0.689	1.333	1.740	2.110	2.567	2.898	3.222	3.646	3.965
18	0.257	0.688	1.330	1.734	2.101	2.552	2.878	3.197	3.610	3.922
19	0.257	0.688	1.328	1.729	2.093	2.539	2.861	3.174	3.579	3.883
20	0.257	0.687	1.325	1.725	2.086	2.528	2.845	3.153	3.552	3.850
21	0.257	0.686	1.323	1.721	2.080	2.518	2.831	3.135	3.527	3.819
22	0.256	0.686	1.321	1.717	2.074	2.508	2.819	3.119	3.505	3.792
23	0.256	0.685	1.319	1.714	2.069	2.500	2.807	3.104	3.485	3.767
24	0.256	0.685	1.318	1.711	2.064	2.492	2.797	3.091	3.467	3.745
25	0.256	0.684	1.316	1.708	2.060	2.485	2.787	3.078	3.450	3.725
26	0.256	0.684	1.315	1.706	2.058	2.479	2.779	3.067	3.435	3.707
27	0.256	0.684	1.314	1.703	2.052	2.473	2.771	3.057	3.421	3.690
28	0.256	0.683	1.313	1.701	2.048	2.467	2.763	3.047	3.408	3.674
29	0.256	0.683	1.311	1.699	2.045	2.462	2.756	3.038	3.396	3.659
30	0.256	0.683	1.310	1.697	2.042	2.457	2.750	3.030	3.385	3.646
40	0.255	0.681	1.303	1.684	2.021	2.423	2.704	2.971	3.307	3.551
60	0.254	0.679	1.296	1.671	2.000	2.390	2.660	2.915	3.232	3.460
120	0.254	0.677	1.289	1.658	1.980	2.358	2.617	2.860	3.160	3.373
∞	0.253	0.674	1.282	1.645	1.960	2.326	2.576	2.807	3.090	3.291