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NKUHLU DEPARTMENT FOR ACCOUNTING STUDIES

Financial Management AFM 121 / AFM121E

2nd Semester
NOVEMBER EXAMINATION 2019

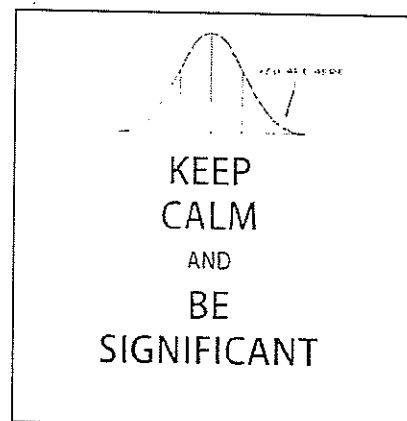
Total: 150 marks

Time: 3 hours

- Write your name and student number in the appropriate spaces.
- This paper consists of **11 pages** [7 exam pages, 1 front pages, 1 information sheet, 1 table and 1 rough work sheet.]
- Answer **ALL** the questions. Number the answers correctly according to the numbering system used in this question paper
- Clearly show **ALL** calculations, diagrams, graphs, etc, used to solve the problems.
- Unless stated otherwise, **round all answers to TWO decimal places.**
- Silent non-programmable calculators may be used.
- **During reading time, you may do workings on tear-off blank paper and on exam paper**

Examiner: S Msakatya


Moderator: L Funnell



QUESTION 1**22 marks (26 mins)**

- 1.1 Mr Thomas invested a total amount of R13 900 divided in two different schemes, A and B, at the *simple interest* rate of 14% p.a. and 11% p.a. respectively. The total amount of simple interest earned in 2 years was R3 508.
- 1.1.1 What was the value of the investment after 2 years? (1)
- 1.1.2 What was the amount invested in Scheme A? (let the amount for A = x) (4)
- 1.2 Project X requires an initial investment of R35 000 but is expected to generate revenues of R10 000, R27 000 and R19 000 for the first, second, and third years, respectively. The required rate of return is 12%. Assume there is no salvage value at the end of the project. Determine the Nett Present Value of the project. (6)
- 1.3 Rihay opened a bank account 15 years ago, with the intention of saving money for when he retires. The bank offered him an interest rate of 1% per month compounded monthly for the first 5 years and thereafter changed the interest rate to 11% per annum compounded quarterly.
- 1.3.1 Rihay made an immediate deposit of R400 000 upon opening the account. He then withdrew R100 000 at the end of 13 years. Calculate how much money he would have in this account at the end of the 15th year. (7)
- 1.3.2 If instead, Rihay had taken a retirement annuity over the same period of 15 years, and the insurance company had offered him 8% per annum compounded monthly, what would his monthly payments have been if he were to save an amount of R 1 800 000 at the end of the 15th year. (4)

QUESTION 2**33marks (40 mins)**

- 2.1 Bokani purchases a motor vehicle for R150 000. He takes out a six-year loan and pays his first instalment 18 months after the granting of the loan. The monthly instalments end 54 months from the first instalment. Interest is fixed at 16% per annum compounded monthly.
- 2.1.1 Calculate his monthly payment.  (6)
- 2.1.2 Due to financial difficulty, Bokani misses the 5th and 6th payments. If the balance outstanding after the 4th payment is R180 469,47 calculate his new increased monthly payment, to accommodate these payments, from the 7th payment onwards. (6)

- 2.2 Eight years ago a company bought office equipment for R3 400 000. The equipment is now valued at R2 000 000. This figure was calculated using the reducing balance depreciation *and* the increased value of the equipment due to inflation.
- 2.2.1 Assume that the rate of inflation was constant at 6,8% per annum, compounded annually. Calculate the depreciated value of the equipment after 8 years, if there was no inflation. (4)
- 2.2.2 Calculate the annual rate of the reducing-balance depreciation on the value of the equipment. Assume that the value of the equipment after 8 years is R1 181 500 (4)
- 2.2.3 The company decides to create a sinking fund (to replace the equipment) that accrues to R5 500 000 over the next six years. The fund earns interest at a rate of 7,64% per annum, compounded monthly. Bi-annual payments (that is, every six months) will be made into the fund. The first payment is made 6 months after opening the fund and ends two years before the fund matures. A once-off withdrawal of R300 000, for maintenance of the current equipment is to be made three years after the fund is started.
- A. Determine the equivalent bi-annual interest rate of the fund. (2)
- B. Calculate the total value (*to the nearest thousand*), of the sinking fund now needed in order to buy the new equipment and to service the maintenance required. (5)
- C. Calculate the value of the bi-annual payments. (6)

QUESTION 3**33 marks (40 mins)**

- 3.1 Below is the summary of statistics on the *prices* (in R) of accounting textbooks sold in a month in a certain bookstore

Statistics - prices		
N	Valid	150
Mean		155.05
Median		110.00
Mode		75.00
Std deviation		35.75
minimum		48.00
maximum		375.95
Percentiles	25	53.00
	50	110.00
	75	295.00

- 3.1.1 What is the data range for the textbook prices? (2)
- 3.1.2 Determine the interquartile range for the price of accounting books sold (2)
- 3.1.3 Comment on the skewness based on this data (2)

3.1.4 Statistical rules state that at least 95% of the observations are within *two* standard deviations of the mean. What are the limits? (3)

3.2 The following frequency distribution shows the number of local telephone calls made by 54 randomly selected subscribers during a day.

No. calls made	No. subscribers
6 - 10	15
11 - 15	23
16 - 20	9
21 - 25	5
26 - 30	2
	54

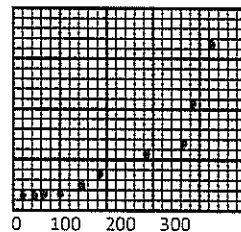
- 3.2.1 Is the variable in this distribution discrete or continuous? (1)
- 3.2.2 Determine the class boundary for the second class (1)
- 3.2.3 Determine the relative frequency for the fourth class (2)
- 3.2.4 Determine the median (3)
- 3.2.5 Estimate the mean and standard deviation for the number of telephone calls (3)

3.3 Records of claims following hurricanes in the USA are kept by an insurance company. The number of injuries, *x* (thousands) and the total approximate cost at *y* (million) dollars, for each of 10 randomly selected hurricanes that occurred between 1930 and 2010 are given in the table.

<i>x</i>	415	362	190	150	47	24	290	390	95	69
<i>y</i>	3200	1390	680	260	200	180	1050	2430	290	210

3.3.1 Use the table in the diagram sheet to calculate the value of Spearman’s rank correlation coefficient between *x* and *y*. (rank from smallest to biggest) (5)

3.3.2 With reference to the scatter diagram for the given data, give a reason why the product moment correlation coefficient is not an appropriate measure. (2)



3.3.3 Use the table to find the equation of the regression line in the form $\hat{y} = a + bx$ (3)

3.3.4 Determine the estimated cost if the number of injuries are 300 000. (2)

3.3.5 Comment on the reliability of the prediction in Question 3.3.4 *and* the limitations of this model. (2)

QUESTION 4**34marks (40 mins)**

4.1 Describe, the relationship between the events A and B, as indicated by each of the following statements:

4.1.1 $P(A|B) = P(A)$ (2)

4.1.2 $P(A|B) = 0$ (2)

4.2 Eva visits the spaza every Thursday to do her weekly shopping. The event that she buys orange juice is denoted by O, and the event that she buys bottled water is denoted by W. At each visit, Eva may buy neither item or one item or both items.

4.2.1 Determine the value (a) to (e) from the table of *probabilities* where O' and W' denote the events 'not O' and 'not W' respectively. (4)

	O	O'	Total
W	C	D	0,65
W'	0,15	E	b
Total	A	0,3	1,00

4.2.2 Hence, or otherwise, find the probability that, on any given Thursday, Eva buys either orange juice or bottled water but not both. (2)

4.2.3 Given that Eva likes water, determine the probability that she does not buy orange juice on a given Thursday. (2)

4.3 Past experience shows that, when they play home matches, Pirates football team win half their matches, lose 20% of the matches and draw the remaining home matches. The team is awarded three points for a win, one point for a draw and no points for a loss. The table below shows the probability distribution of X, the number of points awarded to Pirates after a home match.

x	0	1	3
P(X=x)	a	b	0,5

4.3.1 Determine a and b (2)

4.3.2 Calculate the mean and the standard deviation of the number of points awarded to Pirates after a home match. (5)

- 4.3.3 State the probability that the number of points awarded to Pirates after a home match is more than one standard deviation *above* the mean. (1)
- 4.4 It is known that 60% of students taking a Bachelor of Commerce degree are male. Six students are chosen at random from those students taking a B. Com degree. Calculate the probability that more than four of the students are *female*. (5)
- 4.5 A study undertaken at a hospital found that the number of patients (X) per month contracting a superbug can be modelled by a Poisson distribution with a mean of 1,5.
- 4.5.1 Calculate $P(X=2)$ (2)
- 4.5.2 Find the probability that at most 1 person will contract this superbug during a 3-month period. (5)
- 4.5.3 State 2 assumptions implied using a Poisson model for the number of patients contracting the superbug. (2)

QUESTION 5**28 marks (34 mins)**

- 5.1 Scores on an IQ test are normally distributed with a mean of 100 and a standard deviation of 15.
- 5.1.1 It is said that to have exceptional intelligence, your IQ score must fall above 132. Determine the probability of the world's population that will fall in this category? (4)
- 5.1.2 If 2,25% of the population fall in the lowest category, what IQ score is the maximum score that would put someone in the lowest category? (5)
- 5.2 A marketing manager would like to assess the performance of a product that was launched by his company six weeks ago. The result for a sample of 49 supermarkets countrywide indicated average sales of R3 140 per week with a standard deviation of R345.
- 5.2.1 Estimate a 95% confidence interval of the actual average sales per week. (5)
- 5.2.2 Give an interpretation of the confidence interval. (1)

5.3 At a certain hospital it was found that the probability that a patient did not arrive for an appointment was 0.2. The hospital carries out some publicity in the hope that this probability will be reduced. They wish to test whether the publicity has worked.

5.3.1 It is suggested that the first 30 appointments on a Monday should be used for the test. Give a reason why this is not an appropriate sample. (1)

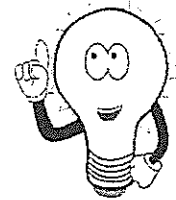
A suitable random sample of 30 appointments is selected and 3 patients do not arrive. This sample is used to carry out a test at the 5% significance level. The critical value at the 5% level is $\pm 1,64$.

5.3.2 Explain why the test is one-tail and state suitable null and alternative hypotheses. (2)

5.3.3 State what is meant by a Type I error in this context (1)

5.3.4 The z-value of the test statistic is -1,37. State whether the publicity has worked or not, explaining your answer. (2)

5.4 A company produces new low-energy light bulbs. The bulbs are described as having 9 watts of power, with a standard deviation of 0,81 watts. The production manager is concerned that the new machine used to make the light bulbs has changed the value of 9 watts. He asks you to conduct a test at a 5% significance level to check whether his concern is valid. You use a random sample of 25 bulbs of the latest batch produced and find that the *mean* of the sample is 9,2 watts.



Conduct the hypothesis test and provide the conclusion you would give to the production manager. (7)

AFM 121- INFORMATION SHEET

Financial Mathematics

$$\begin{aligned}
 FV &= PV(1+in) & FV &= PV(1+i)^n & i &= \left(\frac{FV}{PV}\right)^{\frac{1}{n}} - 1 & 1+i_{eff} &= \left(1+\frac{i}{n}\right)^n \\
 FV_A &= \frac{PMT[(1+i)^n - 1]}{i} & PV_A &= \frac{PMT[1 - (1+i)^{-n}]}{i} \\
 FV_{AD} &= \frac{PMT[(1+i)^n - 1]}{i}(1+i) & PV_{AD} &= \frac{PMT[1 - (1+i)^{-n}]}{i}(1+i) & PV_{AP} &= \frac{PMT}{i} \\
 FV &= PV(1-in) & FV &= PV(1-i)^n & i &= 1 - \left(\frac{FV}{PV}\right)^{\frac{1}{n}}
 \end{aligned}$$

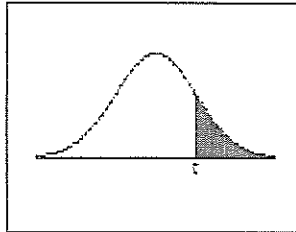
Statistics

$$\begin{aligned}
 \bar{x} &= \frac{\sum x}{n} & \bar{x} &= \frac{\sum f \times x}{n} & \text{Outlier: Lower} &= Q_1 - 1,5 \times IQR \\
 & & & & \text{Upper} &= Q_3 + 1,5 \times IQR \\
 \text{median} &= l + \frac{(u-l)\left(\frac{n}{2} - F_{previous}\right)}{f} & SD &= s = \sqrt{\frac{\sum (x-\bar{x})^2}{n-1}} & SD &= s = \sqrt{\frac{\sum f(x-\bar{x})^2}{n-1}} \\
 \hat{y} &= a + bx & a &= \bar{y} - b\bar{x} \\
 r &= \frac{\sum (x-\bar{x})(y-\bar{y})}{\sqrt{\sum (x-\bar{x})^2 \sum (y-\bar{y})^2}} & b &= \frac{\sum (x-\bar{x})(y-\bar{y})}{\sum (x-\bar{x})^2} & R &= 1 - \frac{6 \sum d^2}{n(n^2 - 1)}
 \end{aligned}$$

Probability and Probability Distributions

$$\begin{aligned}
 P(E) &= \frac{n(E)}{n(S)} & P(A \text{ or } B) &= P(A) + P(B) - P(A \text{ and } B) & P(A \text{ and } B) &= P(A) \times P(B|A) \\
 P(A|B) &= \frac{P(A \text{ and } B)}{P(B)} & E(X) &= \sum_x xP(X=x) & \text{var}(X) &= E(X^2) - [E(X)]^2 \\
 P(X=x) &= {}^n C_x p^x (1-p)^{n-x} & \mu &= E(X) = np & \text{var}(X) &= np(1-p) \\
 P(X=x) &= \frac{\lambda^x e^{-\lambda}}{x!} & E(X) &= \text{var}(X) = \lambda & z &= \frac{x-\mu}{\sigma} \\
 C.I. &= \bar{x} \pm z \times \frac{\sigma}{\sqrt{n}} & C.I. &= \bar{x} \pm t \times \frac{s}{\sqrt{n}}; \text{ with } (n-1) d.f. \\
 z &= \frac{\bar{x} - \mu}{\left(\frac{\sigma}{\sqrt{n}}\right)} & t &= \frac{\bar{x} - \mu}{\left(\frac{s}{\sqrt{n}}\right)}; \text{ with } (n-1) d.f. & z &= \frac{\hat{p} - p}{\sqrt{\frac{p(1-p)}{n}}} \text{ where } \hat{p} = \frac{x}{n}
 \end{aligned}$$

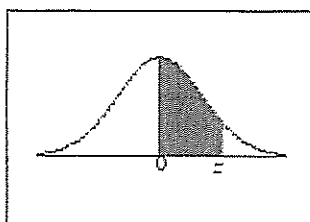
t-Distribution Table



The shaded area is equal to α for $t = t_{\alpha}$.

α	$t_{.100}$	$t_{.050}$	$t_{.025}$	$t_{.010}$	$t_{.005}$
1	3.078	6.314	12.706	31.821	63.657
2	1.886	2.920	4.303	6.965	9.925
3	1.638	2.353	3.182	4.541	5.841
4	1.533	2.132	2.776	3.747	4.604
5	1.476	2.015	2.571	3.365	4.032
6	1.440	1.943	2.447	3.143	3.707
7	1.415	1.895	2.365	2.998	3.499
8	1.397	1.860	2.306	2.896	3.356
9	1.383	1.833	2.262	2.821	3.250
10	1.372	1.812	2.228	2.764	3.169
11	1.363	1.796	2.201	2.718	3.106
12	1.356	1.782	2.179	2.681	3.055
13	1.350	1.771	2.160	2.650	3.012
14	1.345	1.761	2.145	2.624	2.977
15	1.341	1.753	2.131	2.602	2.947
16	1.337	1.746	2.120	2.583	2.921
17	1.333	1.740	2.110	2.567	2.898
18	1.330	1.734	2.101	2.552	2.878
19	1.328	1.729	2.093	2.539	2.861
20	1.325	1.725	2.086	2.528	2.845
21	1.323	1.721	2.080	2.518	2.831
22	1.321	1.717	2.074	2.508	2.819
23	1.319	1.714	2.069	2.500	2.807
24	1.318	1.711	2.064	2.492	2.797
25	1.316	1.708	2.060	2.485	2.787
26	1.315	1.706	2.056	2.479	2.779
27	1.314	1.703	2.052	2.473	2.771
28	1.313	1.701	2.048	2.467	2.763
29	1.311	1.699	2.045	2.462	2.756
30	1.310	1.697	2.042	2.457	2.750
32	1.309	1.694	2.037	2.449	2.738
34	1.307	1.691	2.032	2.441	2.728
36	1.306	1.688	2.028	2.434	2.719
38	1.304	1.686	2.024	2.429	2.712
∞	1.282	1.645	1.960	2.326	2.576

Standard Normal Distribution Table



z	.00	.01	.02	.03	.04	.05	.06	.07	.08	.09
0.0	.0000	.0040	.0080	.0120	.0160	.0199	.0239	.0279	.0319	.0359
0.1	.0398	.0438	.0478	.0517	.0557	.0596	.0636	.0675	.0714	.0753
0.2	.0793	.0832	.0871	.0910	.0948	.0987	.1026	.1064	.1103	.1141
0.3	.1179	.1217	.1255	.1293	.1331	.1368	.1406	.1443	.1480	.1517
0.4	.1554	.1591	.1628	.1664	.1700	.1736	.1772	.1808	.1844	.1879
0.5	.1915	.1950	.1985	.2019	.2054	.2088	.2123	.2157	.2190	.2224
0.6	.2257	.2291	.2324	.2357	.2389	.2422	.2454	.2486	.2517	.2549
0.7	.2580	.2611	.2642	.2673	.2704	.2734	.2764	.2794	.2823	.2852
0.8	.2881	.2910	.2939	.2967	.2995	.3023	.3051	.3078	.3106	.3133
0.9	.3159	.3186	.3212	.3238	.3264	.3289	.3315	.3340	.3365	.3389
1.0	.3413	.3438	.3461	.3485	.3508	.3531	.3554	.3577	.3599	.3621
1.1	.3643	.3665	.3686	.3708	.3729	.3749	.3770	.3790	.3810	.3830
1.2	.3849	.3869	.3888	.3907	.3925	.3944	.3962	.3980	.3997	.4015
1.3	.4032	.4049	.4066	.4082	.4099	.4115	.4131	.4147	.4162	.4177
1.4	.4192	.4207	.4222	.4236	.4251	.4265	.4279	.4292	.4306	.4319
1.5	.4332	.4345	.4357	.4370	.4382	.4394	.4406	.4418	.4429	.4441
1.6	.4452	.4463	.4474	.4484	.4495	.4505	.4515	.4525	.4535	.4543
1.7	.4554	.4564	.4573	.4582	.4591	.4599	.4608	.4616	.4625	.4633
1.8	.4641	.4649	.4656	.4664	.4671	.4678	.4686	.4693	.4699	.4706
1.9	.4713	.4719	.4726	.4732	.4738	.4744	.4750	.4756	.4761	.4767
2.0	.4772	.4778	.4783	.4788	.4793	.4798	.4803	.4808	.4812	.4817
2.1	.4821	.4826	.4830	.4834	.4838	.4842	.4846	.4850	.4854	.4857
2.2	.4861	.4864	.4868	.4871	.4875	.4878	.4881	.4884	.4887	.4890
2.3	.4893	.4896	.4898	.4901	.4904	.4906	.4909	.4911	.4913	.4916
2.4	.4918	.4920	.4922	.4925	.4927	.4929	.4931	.4932	.4934	.4936
2.5	.4938	.4940	.4941	.4943	.4945	.4946	.4948	.4949	.4951	.4952
2.6	.4953	.4955	.4956	.4957	.4959	.4960	.4961	.4962	.4963	.4964
2.7	.4965	.4966	.4967	.4968	.4969	.4970	.4971	.4972	.4973	.4974
2.8	.4974	.4975	.4976	.4977	.4977	.4978	.4979	.4979	.4980	.4981
2.9	.4981	.4982	.4982	.4983	.4984	.4984	.4985	.4985	.4986	.4986
3.0	.4987	.4987	.4987	.4988	.4988	.4989	.4989	.4989	.4990	.4990
3.1	.4990	.4991	.4991	.4991	.4992	.4992	.4992	.4992	.4993	.4993
3.2	.4993	.4993	.4994	.4994	.4994	.4994	.4994	.4995	.4995	.4995
3.3	.4995	.4995	.4995	.4996	.4996	.4996	.4996	.4996	.4996	.4997
3.4	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4997	.4998
3.5	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998	.4998

Glenn Feldman, Professor with 19 1/2 years on April 22, 2006

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(ALSO for USE during reading time)

Name:

Student no:

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