UNIVERSITY EXAMINATIONS

UNIVERSITEITSEKSAMENS

UNISA university of south africa

DSC1630 (471017) October/November 2012

DEPARTMENT DECISION SCIENCES
INTRODUCTORY FINANCIAL MATHEMATICS

Duration 2 Hours 100 Marks

EXAMINERS
FIRST MRS MF IMMELMAN
SECOND DR MP MULAUDZI

Programmable pocket calculator is permissible

Closed book examination.

This examination question paper remains the property of the University of South Africa and may not be removed from the examination venue.

This paper consists of 23 pages including a list of formulæ, a table with the number of each day of the year and 10 sheets of paper for rough work, plus instructions for completing a mark-reading sheet

Please complete the attendance register on the back page, tear it off and hand it to the invigilator.

Answer *all* questions on the mark-reading sheet supplied Carefully follow the instructions for completing the mark-reading sheet Also pay attention to the following.

- Only one option (indicated as [1] [2] [3] [4] [5]) per question is correct Do not mark more than one option per question on the mark-reading sheet
- Marks will *not* be deducted for incorrect answers
- There are 30 questions for a total of 100 marks

You are strongly advised to write your name on the mark-reading sheet. Then, if you have entered your student number incorrectly, we will still be able to link you to the mark-reading sheet.

[TURN OVER]

Question 1

Alet needs R10 500 in ten months' time to buy herself a new lens for her camera Two months ago she deposited R9 000 in a savings account at a simple interest rate of 11,5% per year How much money will Alet still need to buy the lens ten months from now?

[1] R229,50
[2] R408,67
[3] R465,00
[4] R637,50
[5] None of the above

Question 2

Chappie borrowed money on 31 August and agreed to pay back the loan on 2 November of the same year If the discount rate is 18% per year and he received R5 000 on 31 August, what is the value of the loan that Chappie has to pay the bank on 2 November?

[1] R5 000,00
[2] R5 160,32
[3] R4 844,66
[4] R5 155,34
[5] None of the above

Question 3

If money is worth 12% per annum compounded monthly, the principal P will double The time under consideration is therefore .

[1] 5,81 years.
[2] 6,12 years
[3] 7,27 years
[4] 8,33 years
[5] 69,66 years

ROUGH WORK

Questions 4 and 5 relate to the following situation:
Bongi wants to open a delicatessen in the Good Food Mall. On 7 March he invested R375 000 into an account earning 10,45% interest per year, compounded monthly. Interest is credited on the first of every month Bongi will move into his new shop on 28 November of the same year

Question 4

If simple interest is used for odd period calculations and compound interest for full periods, then the amount of money that Bongi will have available in the account on 28 November of the same year will equal .

[1] R403 558,56
[2] R404 300,59.
[3] R404 348,61
[4] R404 419,59
[5] R404 540,76

Question 5

If fractional compounding is used for the full term, the amount of money that Bongi will have available in the account on 28 November will equal

[1] R403 558,56
[2] R404 300,59
[3] R404 348,61
[4] R404 415,85
[5] R404 540,76

Question 6

Jacob invests an amount of money in an account earning 13,88% interest per year, compounded weekly After five years, this amount has accumulated to R50 000 The amount that was invested initially equals

[1] R15 300,00
[2] R25 001,79
[3] R26 105,54
[4] R29 515,94
[5] R34 700,00

ROUGH WORK

Question 7

After investing an amount of money in an account earning interest at a continuous compounding rate of 10,15% per year, you receive R32 412,87 The amount of money that you invested 57 weeks earlier equals approximately

[1] R29 000,00.
[2] R29 153,86
[3] R29 167,68.
[4] R32 768,16.
[5] R36 227,38

Question 8

An interest rate of 14,9% per year, compounded quarterly, is equivalent to a weekly compounded interest rate of .

[1] 14,65%.
[2] 14,88%
[3] 15,16%.
[4] 19,02%.
[5] none of the above

Question 9

If the nominal interest rate per year is 16,5% per annum compounded at the end of every second month, then the effective interest rate equals

[1] 14,527%
[2] 16,181%
[3] 16,677%.
[4] 17,677%.
[5] 18,000%

ROUGH WORK

Question 10

Freedman inherits R2 500 000 He decides to have it paid out to him in two payments one payment four years from now and the other payment, three times the first payment, ten years from now The amount that he can expect to receive ten years from now, if an interest rate of 12,25% per year compounded quarterly is applicable, approximately equals

[1] R1 650 400

[2] R1 875 000.

[3] R2 088 850

[4] R4 951 240

[5] R6 266 545

Question 11

Six years ago Jakes borrowed R150 000 from Martha on condition that he would pay her back nine years from now at an interest rate of 15,5% per year compounded monthly He also owes Martha R250 000 payable six years from now at an interest rate of 16,4% per year compounded half-yearly. Jakes asked Martha if he could settle both his debts in one payment three years from now. The total amount that Jakes has to pay Martha three years from now equals

[1] R400 000,00

[2] R475 017,72

[3] R488 092,15

[4] R755 667,10

[5] R777 202,69

Question 12

The sports club's fund must pay Tandi R3 500 per month indefinitely as compensation for an injury she sustained at the club The approximate amount of money available in the fund for this purpose now, if an interest rate of 11,2% per year, compounded monthly is applicable, equals .

[1] R229 934.

[2] R330 132

[3] R334 661

[4] R375 000

[5] R390 443

ROUGH WORK

Question 13

Monthly payments of R1 200 are paid into a savings account. The applicable interest rate is 7,75% per year, compounded quarterly. After ten years the accumulated amount of these monthly payments approximately to the nearest hundred rand equals .

[1] R144 000

[2] R215 900

[3] R216 500.

[4] R291 100

[5] none of the above.

Question 14

If $S = Pe^{ct}$, then c equals ..

[1] $\dfrac{\frac{S}{P} - e}{t}$.

[2] $\dfrac{S - P}{e^t}$

[3] $\dfrac{S + P}{e^t}$.

[4] $\dfrac{\ln(S - P)}{t}$

[5] $\dfrac{\ln\left(\frac{S}{P}\right)}{t}$.

Question 15

Fawzia takes out an endowment policy that matures in 20 years time The expected interest rate per year is 10% Her first payment is R3 600 per year, after which the yearly payment will increase by R360 each year. The amount that she can expect to receive on the maturity date will be

[1] R213 030

[2] R340 380

[3] R412 380

[4] R484 380

[5] none of the above

ROUGH WORK

Questions 16 and 17 relate to the following situation:
Aziza wants to open a curry shop Her husband Hamad lends her the money However, she will only be able to start paying him back five years from now She will then be able to pay R25 000 every second month for six years Interest is charged at 16,9% per year, compounded every two months

Question 16

The amount that Aziza owes her husband when she starts paying him back equals .

[1] R184 087,12
[2] R229 591,36
[3] R487 279,43
[4] R561 047,91
[5] R900 000,00

Question 17

The amount that Aziza's husband lends her now equals

[1] R81 795,20
[2] R105 167,85
[3] R216 512,27
[4] R243 834,05
[5] R391 144,22

Question 18

Monique wants to upgrade her studio in four years' time and estimates that it will cost her R350 000 She starts to save *immediately* by depositing R5 000 at the beginning of every month in an account earning 12,4% per year, compounded monthly. The amount still needed just before she starts to renovate her studio will equal

[1] R38 117,25
[2] R41 307,07
[3] R49 591,37
[4] R51 538,80
[5] R110 000,00

ROUGH WORK

Question 19

Lewis's debt of R275 000 from Ellerine at an interest rate of 16% per year, compounded quarterly, is payable in five years' time. The debt will be discharged by the sinking fund method The sinking fund will earn interest at a rate of 14% per year, compounded half-yearly The half-yearly deposits in the sinking fund approximately equal .

[1] R9 235
[2] R13 750.
[3] R19 904.
[4] R20 235.
[5] R27 500.

Question 20

The following is an extract from an amortisation schedule for the Busy Fingers Knit Shop The loan will be paid off in 15 years

Month	Outstanding principal at beginning of the month	Interest due	Payment	Principal repaid
15	385 232,41	3 081,86	A	1 119,21

The value of A equals .

[1] R125,00
[2] R344,20.
[3] R1 962,65
[4] R2 140,18
[5] R4 201,07

Question 21

Karen's investment of R1 050 000 in Pump Up The Jam restaurant is expected to yield the following sequence of yearly cash flows over the next six years R350 000, R320 000, R240 000, R500 000, R80 000 and R60 000 The IRR (internal rate of return) of the investment therefore equals

[1] 6,71%
[2] 7,94%
[3] 12,41%.
[4] 14,76%.
[5] 15,24%

ROUGH WORK

Questions 22, 23 and 24 relate to the following situation:
David buys a bachelor flat and makes a down payment of 20% on the price of the flat. For the remaining amount he manages to secure a loan at an interest rate of 9,75% per year, compounded monthly for a period of 20 years His monthly payment is R5 311,69

Question 22

The size of the loan (to the nearest rand) equals .

[1] R295 723
[2] R491 712
[3] R560 000
[4] R1 089 577
[5] none of the above

Question 23

The price of the flat is

[1] R354 868.
[2] R614 640.
[3] R672 000
[4] R700 000
[5] R1 529 767

Question 24

If an average inflation rate of 4,67% per year is expected, then the total real cost of the loan equals

[1] R101 198,33
[2] R267 543,13
[3] R458 801,66
[4] R560 000,00
[5] R827 543,13

ROUGH WORK

Question 25

The Girls' Best Friend Boutique sells diamonds The following table represents the number of diamonds sold (y) and the carat value of the diamonds (x)

x	0,5	1	2	5
y	1 000	800	500	20

Suppose there is a linear relationship between the carat value of the diamond and the number of diamonds sold. The coefficient of correlation between the carat value of the diamond and the number of diamonds sold is ...

[1] −2,0758.
[2] −0,98185
[3] 0,98185
[4] 1,20213
[5] 1,6250.

Question 26

The slope of the regression line of the above mentioned relationship is

[1] −207,59
[2] −0,98185.
[3] 2,125
[4] 1 021,13.
[5] none of the above

Question 27

Consider stock ABC

Coupon rate·	9,75% per year
Yield to maturity	11,25% per year
Settlement date	15 November 2012
Maturity date	7 August 2035

The all-in price equals .

[1] R85,63641%
[2] R87,80282%
[3] R87,86673%
[4] R90,39112%
[5] R92,67782%

ROUGH WORK

Question 28

The equation for the present value of stock CCC on 17 December 2012 is given by

$$107{,}55174 = da_{\overline{29}|0{,}135} + 100(1 + \frac{0{,}135}{2})^{-29}$$

The half-yearly coupon rate d is equal to .

[1] 6,75%
[2] 7,35%
[3] 8,55%
[4] 14,70%
[5] none of the above

Question 29

If the profitability index of the Soft Serve Parlour is 1,0514 and the NPV (net present value) equals R25 700, then the original investment approximately equals

[1] R12 528
[2] R13 172
[3] R24 444
[4] R25 700.
[5] R50 000

Question 30

You must choose between two investments, A and B The profitability index (PI), net present value (NPV) and internal rate of return (IRR) of the two investments are as follows

Criteria	Investment A	Investment B
NPV	−44000	38 000
PI	0,945	1,051
IRR	15,37	21,82

What investment/s should you choose, taking all the above criteria into consideration, if the cost of capital is equal to 19% per year?

[1] A
[2] B
[3] Both A and B
[4] Neither A nor B
[5] Too little information to make a decision

ROUGH WORK

The number of each day of the year

FOR LEAP YEARS, ADD ONE TO THE NUMBER OF EVERY DAY AFTER FEBRUARY 28

Day	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Day
1	1	32	60	91	121	152	182	213	244	274	305	335	**1**
2	2	33	61	92	122	153	183	214	245	275	306	336	**2**
3	3	34	62	93	123	154	184	215	246	276	307	337	**3**
4	4	35	63	94	124	155	185	216	247	277	308	338	**4**
5	5	36	64	95	125	156	186	217	248	278	309	339	**5**
6	6	37	65	96	126	157	187	218	249	279	310	340	**6**
7	7	38	66	97	127	158	188	219	250	280	311	341	**7**
8	8	39	67	98	128	159	189	220	251	281	312	342	**8**
9	9	40	68	99	129	160	190	221	252	282	313	343	**9**
10	10	41	69	100	130	161	191	222	253	283	314	344	**10**
11	11	42	70	101	131	162	192	223	254	284	315	345	**11**
12	12	43	71	102	132	163	193	224	255	285	316	346	**12**
13	13	44	72	103	133	164	194	225	256	286	317	347	**13**
14	14	45	73	104	134	165	195	226	257	287	318	348	**14**
15	15	46	74	105	135	166	196	227	258	288	319	349	**15**
16	16	47	75	106	136	167	197	228	259	289	320	350	**16**
17	17	48	76	107	137	168	198	229	260	290	321	351	**17**
18	18	49	77	108	138	169	199	230	261	291	322	352	**18**
19	19	50	78	109	139	170	200	231	262	292	323	353	**19**
20	20	51	79	110	140	171	201	232	263	293	324	354	**20**
21	21	52	80	111	141	172	202	233	264	294	325	355	**21**
22	22	53	81	112	142	173	203	234	265	295	326	356	**22**
23	23	54	82	113	143	174	204	235	266	296	327	357	**23**
24	24	55	83	114	144	175	205	236	267	297	328	358	**24**
25	25	56	84	115	145	176	206	237	268	298	329	359	**25**
26	26	57	85	116	146	177	207	238	269	299	330	360	**26**
27	27	58	86	117	147	178	208	239	270	300	331	361	**27**
28	28	59	87	118	148	179	209	240	271	301	332	362	**28**
29	29		88	119	149	180	210	241	272	302	333	363	**29**
30	30		89	120	150	181	211	242	273	303	334	364	**30**
31	31		90		151		212	243		304		365	**31**

FORMULÆ

$I = Prt$	$r = \dfrac{d}{1-dt}$
$S = P(1+rt)$	$S = (1+i)Rs_{\overline{n}\vert i}$
$P = S(1-dt)$	$P = (1+i)Ra_{\overline{n}\vert i}$
$S = P\left(1+\dfrac{j_m}{m}\right)^{tm}$	$P = da_{\overline{n}\vert z} + 100(1+z)^{-n}$
$j_{eff} = 100\left(\left(1+\dfrac{j_m}{m}\right)^{m} - 1\right)$	$\dfrac{H-R}{365} \times c$
$S = Pe^{ct}$	$\dfrac{-R}{365} \times c$
$j_\infty = 100(e^c - 1)$	$MIRR = \left(\dfrac{C}{PV_{\text{out}}}\right)^{\frac{1}{n}} - 1$
$c = m\ln\left(1+\dfrac{j_m}{m}\right)$	$P = \frac{R}{i}$
$j_m = m\left(e^{\frac{c}{m}} - 1\right)$	$S = \left[R + \frac{Q}{i}\right] s_{\overline{n}\vert i} - \frac{nQ}{i}$
$i = n\left(\left(1+\dfrac{j_m}{m}\right)^{\frac{m}{n}} - 1\right)$	$T_r = Ra_{\overline{n}\vert r} - P$
$S = R\left(\dfrac{(1+i)^n - 1}{i}\right)$	$\bar{x} = \dfrac{\sum_{i=1}^{n} x_i}{n}$
$S = Rs_{\overline{n}\vert i}$	$\bar{x}_w = \dfrac{\sum_{i=1}^{n} x_i w_i}{\sum_{i=1}^{n} w_i}$
$P = Ra_{\overline{n}\vert i}$	$\sum_{i=1}^{n} i = \dfrac{n(n+1)}{2}$
$P = R\left(\dfrac{(1+i)^n - 1}{i(1+i)^n}\right)$	$S = \sqrt{\dfrac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n-1}}$
$A = nR + Q\left[\dfrac{n(n-1)}{2}\right]$	

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EXAMINATION MARK READING SHEET

EKSAMEN-MERKLEESBLAD

PART 1 (GENERAL/ALGEMEEN) DEEL 1

STUDY UNIT e g PSY100-X
STUDIE-EENHEID bv PSY100-X

1

PAPER NUMBER
VRAESTELNOMMER

2

INITIALS AND SURNAME
VOORLETTERS EN VAN

3

DATE OF EXAMINATION
DATUM VAN EKSAMEN

4

EXAMINATION CENTRE (E G PRETORIA)
EKSAMENSENTRUM (BV PRETORIA)

5

STUDENT NUMBER
STUDENTENOMMER

6

7

UNIQUE PAPER NO
UNIEKE VRAESTEL NR

8

9

For use by examination invigilator

Vir gebruik deur eksamenopsiener

IMPORTANT

1 USE ONLY AN HB PENCIL TO COMPLETE THIS SHEET
2. MARK LIKE THIS
3 CHECK THAT YOUR INITIALS AND SURNAME HAS BEEN FILLED IN CORRECTLY
4 ENTER YOUR STUDENT NUMBER FROM LEFT TO RIGHT
5 CHECK THAT YOUR STUDENT NUMBER HAS BEEN FILLED IN CORRECTLY
6 CHECK THAT THE UNIQUE NUMBER HAS BEEN FILLED IN CORRECTLY
7 CHECK THAT ONLY ONE ANSWER PER QUESTION HAS BEEN MARKED
8 DO NOT FOLD

BELANGRIK

1 GEBRUIK SLEGS N HB-POTLOOD OM HIERDIE BLAD TE VOLTOOI
2 MERK AS VOLG
3 KONTROLEER DAT U VOORLETTERS EN VAN REG INGEVUL IS
4 VUL U STUDENTENOMMER VAN LINKS NA REGS IN
5 KONTROLEER DAT U DIE KORREKTE STUDENTENOMMER VERSTREK HET
6 KONTROLEER DAT DIE UNIEKE NOMMER REG INGEVUL IS
7 MAAK SEKER DAT NET EEN ALTERNATIEF PER VRAAG GEMERK IS
8 MOENIE VOU NIE

PART 2 (ANSWERS/ANTWOORDE) DEEL 2

10

Specimen only