FACULTY OF SCIENCE
FAKULTEIT NATUURWETENSKAPPE

DEPARTMENT OF PURE AND APPLIED MATHEMATICS	
MODULE:	MATHEMATICS FOR DIPLOMA STUDENTS 1 MFD001
CAMPUS:	APB AND SWC
ASSESSMENT:	JANUARY SSA EXAM

DATE: **15 JANUARY 2015** SESSION: **10:00 TO 12:00**

ASSESSORS: **MRS T OBERHOLZER**

INTERNAL
MODERATOR: **MRS S RICHARDSON**

DURATION: 2 HOURS MARKS: 80

INITIALS AND SURNAME: _____

STUDENT NUMBER: _____
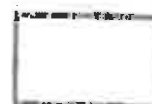
CONTACT NUMBER: _____

CAMPUS: | **APB** | **SWC** |

NUMBER OF PAGES: 16 PAGES, INCLUDING COVER PAGE

INSTRUCTIONS: ANSWER ALL THE QUESTIONS **IN PEN**
GRAPHS MUST ALSO BE DRAWN IN PEN
NO TIPEX ALLOWED
STATE ALL FORMULAS USED
SHOW ALL THE NECCESARY CALCULATIONS
IF NECESSARY ROUND OFF TO TWO DECIMAL PLACES,
UNLESS STATED OTHERWISE
CALCULATORS ARE ALLOWED UNLESS STATED OTHERWISE

QUESTION 1

For each of the following statements indicate whether it is TRUE or FALSE by placing a CROSS (X) in the correct box: IF THE ANSWER **IS FALSE** YOU HAVE TO GIVE A REASON WHY **OR** GIVE THE CORRECT ANSWER.

STATEMENT	TRUE	FALSE
If $y = \pi$ then $f' = 0$		
(-9,4) is a solution for the system of equations: $$-6x + 7y = 82$$ $$-3x + 2y = 35$$		
$\{3, 7, 12, 14\} = \{3, 7, 12, 14, 0\}$		
The set H = {2, 4, 6, 8} has 8 subsets.		
When a normal distribution curve (Bell curve) is skewed right; we see that the tail lies towards $-\infty$.		
In a normal distribution 100% of data information is found within 1 to 3 standard deviation positions from the mean.		

QUESTION 2 [12]

MULTIPLE CHOICE (There is ONLY ONE correct answer)
Circle the correct answer ON YOUR TEST PAPER.

2.1 The amount that should be invested now to accumulate R15 000 at 11,6%,compounded continuously for 5 years is equal to (2)

A   R 11 136.46   C   R 9 000.00

B   R 8 398.66   D   R 8 250.11

2.2 A bag contains 8 green beads and 5 blue beads. A bead is taken from the bag. What is the possibility that the bead is red? (2)

A   1   C   -1

B $\frac{3}{13}$ D   0

2.3 According to the UN Fund for Population Activities, the population of the world x years after the year 2000 will be $5,89e^{0.0175x}$ billion people (for $0 \le x \le 20$). Using this formula to predict the world population in the year 2020, the population size will be: (in billion) (2)

A   8.358   B   5.89

C 9.342×10^{15} D 1.325×10^{16}

2.4 When solving x in $5e^{2x} - 25 = 0$; the value of x is equal to: (2)

A   1,61   C   0,81

B   0,92   D   0

2.5 The probability of getting a five with one roll of a die is (2)

A $\frac{1}{5}$ C $\frac{5}{6}$

B   0.5   D $\frac{1}{6}$

2.6 Find the median of 17, 21, 21, 24, 25, 29, 30, 31   (2)

   A   24   C   24.5

   B   21   D   25

QUESTION 3
[5]

You are given R144 in one- five- and ten Rand notes. There are 35 bills. There are two more ten Rand notes than five Rand notes. How many notes of each type are there?

Find the system of equations and solve the unknowns.
   - Let x = one Rand note; y = five Rand note and z = ten Rand note

MORE SPACE AVAILABLE FOR THIS CALCULATION ON NEXT PAGE.

QUESTION 4 [12]

4.1 Find the maturity value for the simple interest loan of R7 750.00 at 6.8% for 4 months. (3)

4.2 Find the compound amount AND the amount of interest earned if R57 809.34 is compounded at 4% quarterly for 6 years.

(3)

4.3 Find the future value of an annuity where R11 900.00 is deposited at the beginning of each month for 13 months; the money earns 7% compounded monthly.

(4)

4.4   What is the purpose of a sinking fund?   (1)

4.5   State the correct formula to determine the APY.   (1)

QUESTION 5   [7]

5.1   Evaluate the given expressions: (SHOW ALL STEPS AND DO NOT USE
       YOUR CALCULATOR)

       5.1.1 $\log_3 \frac{1}{27}$ (2)

5.1.2 $\ln\frac{1}{e^2} + 2\ln e$ (2)

5.2 Find the value of x by using the properties of logarithms: (DO NOT USE YOUR CALCULATOR) (3)

$$\log_b x = \frac{3}{2}\log_b 4 - \frac{2}{3}\log_b 8$$
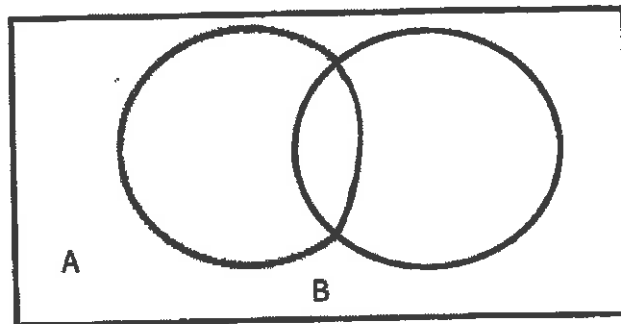
QUESTION 6

6.1 What does the notation $n(A)$ mean? (1)

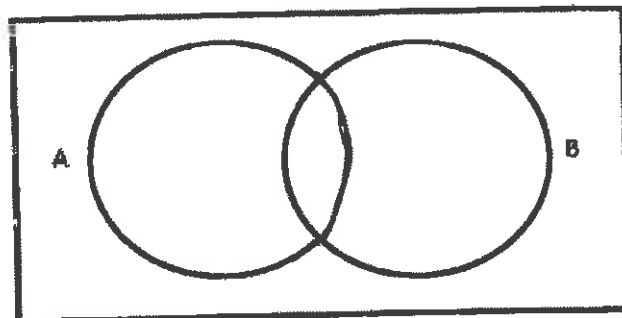6.2 Given the Venn-diagrams below, shade each area as requested:
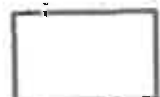
6.2.1 $(A \cup B)'$ (1)

A
B

6.2.2 $A' \cap B'$ (1)

A
B

6.3 Cards numbered from 1 – 12 are placed into a bag.

6.3.1 A card is taken without looking and then replaced into the bag. Write down all the possible outcomes of the event. (1)

6.3.2 If a card is taken from the bag, determine: (5)

    a) P(even number) → P(E) _____

    b) P(prime number) → P(pr) _____

    c) P(multiple of 4) → P(M4) _____

    d) P(E ∩ pr) _____

    e) P(13) _____

QUESTION 7

[5]

John sells computers on commission. He spends 2 hours on selling a laptop and 1 hour on selling a desktop computer. He works no more than 40 hours per week and routinely sells at least 1 laptop and 4 desktops each week. To maximise his income, how many of each type should he sell if his commission is $30 per laptop and $14 per desktop?

- Show all inequalities, let x =laptops and y = desktops and the objective function z represent the total income.
- Draw your graph and feasible region clearly

MORE SPACE AVAILABLE FOR THIS CALCULATION ON NEXT PAGE.
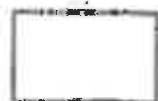
QUESTION 8 [6]

The following results show the scores obtained by MFD students in the Exam out of 80:

23	73	51	22	45
79	65	63	62	51
71	30	72	52	31
33	51	74	73	75

Determine:

8.1   The mode [1]

8.2   The mean [2]

8.3   Standard deviation [2]

8.4   Range [1]

QUESTION 9

9.1 Determine the derivative of the following:

9.1.1 $f(x) = 5x^3 + 2x^2 + \frac{1}{x} - 6$ (2)

9.1.2 $y = y = \ln 9x - 9x$ (2)

9.2 Determine: $\frac{dx}{dy}$ of $6x + 3y = 9$ (3)

9.3 State the Quotient Rule for derivatives. (2)

9.4 By applying the Quotient rule derive the following: $y = \dfrac{x}{3x+5}$ (3)

QUESTION 10 [8]

Given the function $f(x) = 2x^3 + x^2$

10.1 Find the turning points for the curve (if they exist) and determine whether they are minimum or maximum points. (4)

10.2 Determine the slope of the tangent to the curve $y = 2x^3 + x^2$ at the point where $x = 2$. (3)

10.3 Is there a point of inflection? Why? (1)

End of assessment – Total 80 marks

Use this space if you want to redo a question(s). Please indicate clearly at the relevant question(s) that the solution is on this page.