higher education
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Department:
Higher Education and Training
REPUBLIC OF SOUTH AFRICA

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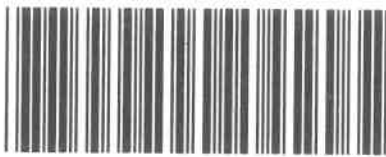**NATIONAL CERTIFICATE**

MATHEMATICS N5

(16030175)

2 August 2017 (X-Paper)
09:00–12:00

This question paper consists of 5 pages and 1 formula sheet of 5 pages.

MATHSN5

DEPARTMENT OF HIGHER EDUCATION AND TRAINING
REPUBLIC OF SOUTH AFRICA
NATIONAL CERTIFICATE
MATHEMATICS N5
TIME: 3 HOURS
MARKS: ~~100~~ 92

INSTRUCTIONS AND INFORMATION

1.   Answer ALL the questions.

2.   Read ALL the questions carefully.

3.   Number the answers according to the numbering system used in this question paper.

4.   Show ALL intermediate steps and simplify where possible.

5.   ALL final answers must be rounded off to THREE decimal places.

6.   Questions may be answered in any order, but subsections of questions must be kept together.

7.   Use only BLUE or BLACK ink.

8.   Write neatly and legibly.

2.5 Calculate $\frac{dy}{dx}$ if $y = \left(\sqrt{x}\right)^x$ with the aid of logarithmic differentiation. (4)

2.6 Given the implicit function:

$$x^2 + xy + y^2 = 3$$

    2.6.1 Determine:

$$\frac{dy}{dx}$$

(3)

    2.6.2 Determine the equation of the tangent to the graph at the point (1,1). (3)

[25]

QUESTION 3

3.1 Given:

$$f(x) = x^3 - x - 1$$

    3.1.1 Determine the coordinate of the point of inflection of $f(x)$ (2)

    3.1.2 Draw up a table of x and $f(x)$, where x is ranging from $x = -3$ to $x = 3$. (2)

    3.1.3 Draw a neat graph of $f(x)$ between these values showing the point of inflection on it. (3)

    3.1.4 Use the table and the graph to estimate a value for the best root between $x = 1$ and $x = 2$ of the equation $x^3 - x - 1$ and then use Taylor's/Newton's method to determine a better approximation of this root. (Root correct to THREE decimal figures.) (4)

3.2 Two resistors with resistances R_1 and R_2 are connected in parallel, and the total resistance measured in ohms (Ω) is given by

$$\frac{1}{R} = \frac{1}{R_1} + \frac{1}{R_2}$$

If R_1 and R_2 are increasing at rates of 0,3Ω/s and 0,2 Ω/s respectively, how fast is R changing when $R_1 = 80\,\Omega$ *and* $R_2 = 100\,\Omega$? (5)

[16]

QUESTION 6

6.1   Determine the general solution of $(1-x)y\,dx = (y-1)x\,dy$ (3)

6.2   Calculate the particular solution of $\dfrac{d^2y}{dx^2} = -\left(x^2-1\right)^2$; if $\dfrac{dy}{dx} = 0, x = 1$ and $y = 2$ (5)

     [8]

                                   TOTAL: **100**

92