Uva Wellassa University of Sri Lanka
Faculty of Applied Sciences
Department of Science and Technology 0073
100 level 1st Semester Examination – August 2019
SCT 101-1 Essential Mathematics

Uva Wellassa University

Instructions to candidates
Duration: one (01) hour
Number of questions: Two (02) Essay questions
Mark allocation: 100 mark
Use standard symbols without definition.
Scientific calculators are allowed.
Answer all questions.

1.

a. State whether the following statements are **True or False**. Justify your answer.

i. Inverse function of $g(x) = x^2$, where $g : \mathbb{R} \to \mathbb{R}$ is $g^{-1}(x) = \sqrt{x}$.

(05 mark)

ii. The function $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = e^x$ is a bijective function.

(05 mark)

b.

i. Is the function $f : \mathbb{R} \to \mathbb{R}$ defined by $f(x) = 4x + 1$ bijective ? **Justify** your answer. (10 mark)

ii. If $h(x) = \sqrt{2x - 5}$ and $g(x) = 5x^2 - 3$, find $(g \text{ o } h)(x)$. (05 mark)

c.

i. Solve the inequality , $(x - 8) \leq x(x - 8) \leq 20$. (10 mark)

ii. Decompose $\dfrac{4x+5}{(2x^2+1)(x+3)}$ in to partial fractions. (10 mark)

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2.

a. Expand $(1 + 3x)^8$ as far as the term in x^3. **Hence** calculate 1.03^8 correct to 5 decimal places.

(10 mark)

b.

i. Prove the trignometric identity, $\sin^2 A + \cos^2 A = 1$. (05 mark)

ii. **Hence**, prove that, $\cot A + \tan A = \operatorname{cosec} A \sec A$. (10 mark)

c. If $A = (-2.5, 0)$ and $B = (0, 5)$ are two points on cartesian plane.

i. Find the distance between points A and B. (05 mark)

ii. What is the mid point of the line segmant joining A and B. (05 mark)

iii. Find the gradient of line segmant joining A and B. (05 mark)

iv. Find the equation of straight line joining A and B. (05 mark)

d. Find the centre and the radius of a circle with the equation $x^2 + y^2 + 4x - 6y + 12 = 0$.

(10 mark)