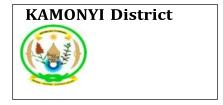
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## HOLYDAYS WORK QUESTION PAPER GRADE: SENIOR FIVE

## SENIOR

## **COMBINATIONS:**

- Mathematics-Computer Science-Economics (MCE)
- Mathematics-Economics-Geography (MEG)

MARKS: ...../100

## **INSTRUCTIONS**

1) This paper cotains  $\boldsymbol{two}$  sections:

**Section A**: Attempt **all** questions

(55 marks)

**Section B**:Attempt **three** questions only

(45 marks)

2) You may use mathematical instruments and a calculator **where necessary** 

Section A: Attempt all questions

(55 marks)

1. Simplify  $\frac{\sqrt{3}}{2}\sin\theta + \frac{1}{2}\cos\theta$ 

(4 marks)

2. If  $\sin A = -\frac{5}{13}$ ,  $\pi < A < 3\frac{\pi}{2}$  and  $\cos B = -\frac{3}{5}\frac{\pi}{2} < B < \pi$ , Find the value of  $\tan(A-B)$  without use of calculator. (4 marks)

3. Solve a) $ 3x - 2  < 1$	(2 marks)
b) $8^{1-y} = 4^{2y+3}$	(2 marks)
4. Without using Hospital's rule, show that $\lim_{x\to 0} \frac{\sin x}{x} = 1$	(4 marks)
5. Find $n^{th}$ derivative of $y = \cos x$	
6. Determine the direction cosines of vector with compone	ent $(1,2,-3)$
	(4 marks)
7. Given that $2 \sin \theta = 7 \cos \theta$ . Find the value of $\cot \theta$	(4 marks)
8. In the study of a function, a curve is said to be concave	upwards(or
convex downwards) in the interval ]a, b[ if	
a) $f''(x) > 0$ for all $x \in ]a, b[$	
b) $f''(x) < 0$ for all $x \in ]a, b[$	
	(4 marks)
9. The definition of the gradient of a line says that:" The g	gradient of a line is
a measure of its"	(3 marks)
a) Stepness	
b) Steepness	
c) Steapness	
d) Stipness	
10. Three learners of senior five were in group and dis	scussed the
equation of the tangent and the normal of the curve $y =$	$5(x^2-3)^{-1}$ at the
point (2,5).Below are the answers provided by them	(3 marks)
a) Mugisha got $y - 20x - 45 = 0$ and $20y = -x + 98$	
b) Niyomugabo got $y = 20x + 45$ and $-x + 20y = 98$	
Irasubiza got $y = 20x - 45$ and $y = \frac{x}{20} + \frac{98}{20}$	
25 = 5	
11. The first four terms of the sequence $\{U_n\}$ where $\frac{1}{2}$ $\frac{1+\sqrt{5}}{2}$ $\frac{1}{2}$ $\frac{1-\sqrt{5}}{2}$	
$U_n = {}_{\sqrt{5}}( {}_2) - {}_{\sqrt{5}}( {}_2)$ , $n \ge 2$ are:	(3 marks)
$\sqrt{5}$ 2 $\sqrt{5}$ 2 $\sqrt{5}$	
a) 1,2,3,4	
b) 1,3,5,7	
c) 1,2,3,5	
d) 2,4,6,8	
12. Matrices representation of linear transformation	f and a are
3 4 1 2 3 2	,
$A = \begin{pmatrix} -1 & 2 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} -1 & 0 & 3 \end{pmatrix}$ respectively.	ind the matrix
4 -5 -3 1 0 2	
representation of:	
a) fog	(2 marks)
b) <i>gof</i>	(2 marks)
13. Find the derivative of $f(x) = \sin^{-1} x^3$	(3 marks)
$1 \text{ Ind the derivative of } f(\lambda) = \sin^2 \lambda$	Page 2 of 3

A(1,2,1), B(2,4,0), C(-1,2,1) and D(2,-2,2). (3 marks) 15. The population of a country grow according to the law  $P = Ae^{0.06t}$ , where P is million in the population at time t and A is a constant given that t = 0, the population is 27.3 millions Calculate the population when: i. t = 10(2 marks) ii. t = 15(2 marks) **Section B**:Attempt **three** questions only (45 marks) 16. The first term of an arithmetic series is 1. The common difference of the series is 6. a) Find the 10<sup>th</sup> term of the series (5 marks) b) The sum of the first *n* terms of the series is 7400. Show that  $3n^2 - 2n - 7400 = 0$ (5 marks) ii. Find the value of *n*. (5 marks)  $\cos A - \sin A = 0$ 17. 0) Verify that A.Adj(A) = det(A).I (15 marks) If  $A = (\sin A)$  $\cos A$ Let T be a linear operator on  $IR^3$  defined by 18. T(x, y, z) = (2y + z, x - 4y, 3x)a) Find the matrix of T in the basis  $\{\vec{e_1} = (1,1,1), \vec{e_2} = (1,1,0), \vec{e_3} = (1,0,0)\}$ (8 marks) b) Verify that  $[T]_e$ .  $[v]_{cosx}$   $[T(v)]_e$  for any vector  $v \in IR^3$ . (7 marks) (5 marks) 19. (b) Simplify the function  $sec^2(tan^{-1}x)$ (5 marks) (c) For which values of x is true that  $\csc(\csc^{-1}x) = x$ (5 marks) (a) Solve graphically  $x - 2 \sin x = 0$ 20. (6 marks) (b) Find the fundamental period of  $f(x) = \cos x\sqrt{3} + \sin 6x$ (9 marks)

Find the volume of triangular prism whose vertices are the points

14.

Good Luck!!!!!