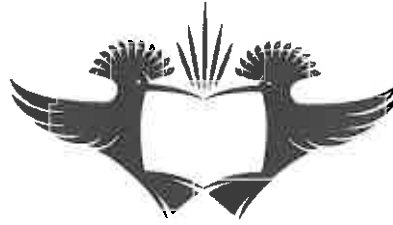


FACULTY OF SCIENCE



**UNIVERSITY
OF
JOHANNESBURG**

DEPARTMENT OF MATHEMATICS

MODULE MAT2T1B
MATHEMATICS FOR TEACHERS 2B

CAMPUS APK

EXAMINATION NOVEMBER 2014

DATE: 11 NOVEMBER 2014

SESSION: 08:30 – 09:30

ASSESSOR:

MR. T. MOHUBEDU

INTERNAL MODERATOR:

MS. S. RICHARDSON

DURATION: 2 HOURS

MARKS: 100

SURNAME AND INITIALS _____

STUDENT NUMBER _____

CONTACT NUMBER _____

NUMBER OF PAGES: 13 PAGES (including front page)

INSTRUCTIONS: ANSWER ALL THE QUESTIONS ON THE PAPER IN PEN

 SHOW ALL CALCULATIONS

 CALCULATORS ARE NOT ALLOWED

Question 1 [10]

1. Determine whether the following statements are true or false. If false, explain why or give an example. [10]

Statement	True or False & Explanation
590° lies in the third quadrant.	
The range of $y = \cos x$ is the set of all the real numbers.	
$1 + \cot^2 x = \csc^2 x$	
$\cos\left(\cos^{-1}\frac{\pi}{6}\right) = \frac{\pi}{6}$	
The domain of $y = \cos^{-1} x$ is the set of all the real numbers.	

Question 2 [10]

The following questions are multiple choice questions. There is only one correct answer from the choices given. Select the correct option by marking the option with an **X**

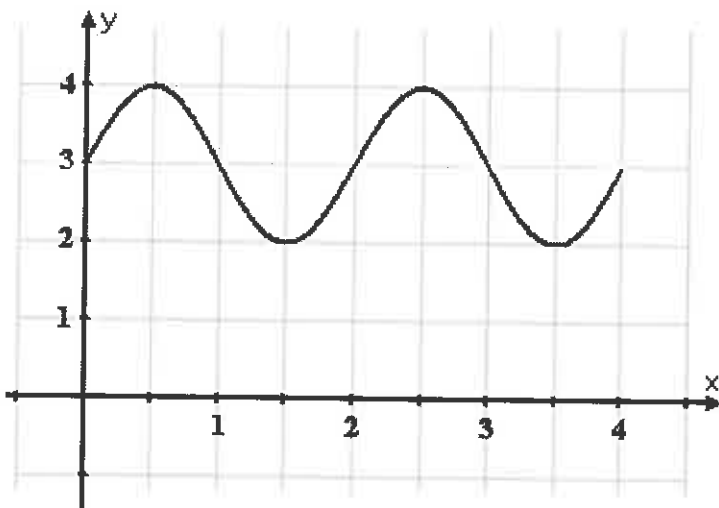
1. The maximum value of $y = \sin x$ is

- a. 0
- b. 1
- c. -1
- d. 2π
- e. None of the above

2. The minimum value of $y = 3 \tan x$ is

- a. 0
- b. 3
- c. -1
- d. -3
- e. None of the above

3. The equation of the graph in the diagram below is



- a. $y = \sin \pi x + 4$
- b. $y = \sin \pi x + 3$
- c. $y = \cos 4\pi x$
- d. $y = 4 \cos \pi x$
- e. None of the above

4. $\sec(2\pi - \theta) \sin\left(\frac{\pi}{2} - \theta\right) =$

- a. 1
- b. -1
- c. $\cos^2 \theta$
- d. $\sin^2 \theta$
- e. None of the above

5. If $x = 30^\circ$ and $y = 45^\circ$ then $\frac{1}{2}\sin(2x + 4y) =$

- a. $-\frac{\sqrt{3}}{4}$
- b. $\frac{\sqrt{3}}{2}$
- c. $\frac{\sqrt{3}}{4}$
- d. $-\frac{1}{4}$
- e. None of the above

Question 3 [21]

1. Convert 200° to radians. [2]

2. Find the positive and the negative coterminal angle of $\frac{\pi}{4}$. [4]

3. Find the value of $\cos\frac{\pi}{6}$ [2]

4. Find the value of $\sin^{-1}\left(-\frac{1}{\sqrt{2}}\right)$ [2]

5. Find the value $\tan \frac{3\pi}{4}$ [3]

6. Find the value of $\sin \frac{\pi}{12}$ [4]

7. Find the value of $\tan\left[\sin^{-1}\left(-\frac{3}{5}\right)\right]$ [4]

Question 4 [12]

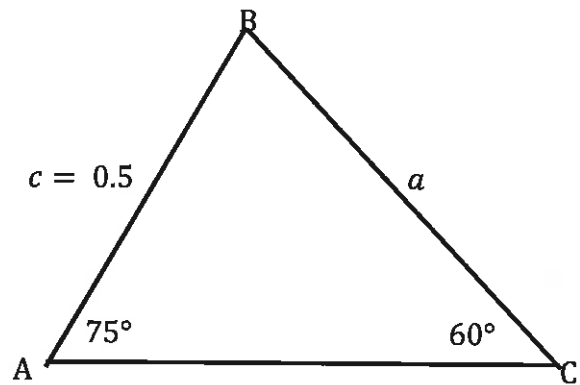
1. If $\tan \theta = \frac{2}{3}$ and $\cos \theta < 0$, find:

1.1 $\sec \theta$ [3]

1.2 $\sin 2\theta$ [2]

2. Find the length of the arc of a circle of radius 3mm that subtends an angle of 60° . [3]

3. Calculate a [4]



Question 5 [13]

1. Simplify $2 \sec \theta \cot \theta - \csc \theta$ [4]

3. Verify the identity

[4]

$$\frac{1}{1 - \sin x} - \frac{1}{1 + \sin x} = 2 \sec x \tan x$$

2. Prove that

[5]

$$\frac{\cos x \cot x}{1 - \sin x} - 1 = \csc x$$

Question 6 [16]

1. Solve $\cos x = \frac{1}{2}$ [2]

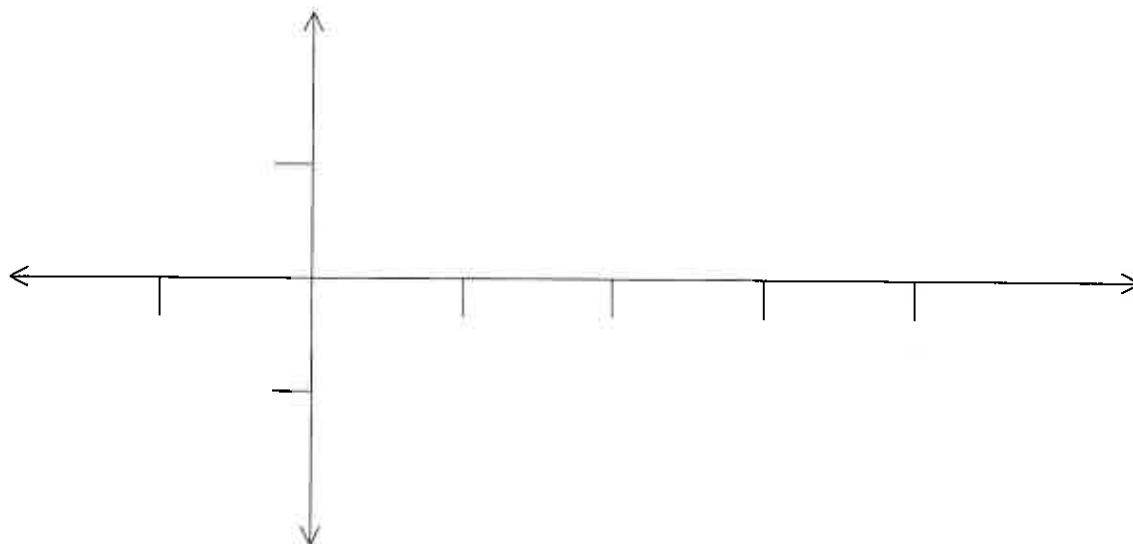
2. Solve $2 \tan^2 x - \tan x - 3 = 0$ [4]

3. Solve $\csc^2 3x - 2 = 0$ [5]

4. Solve $\cos 2x + 3 \cos x - 1 = 0$ [5]

Question 7 [18]

1. Sketch $y = \csc x$, on the interval $\left[-\frac{\pi}{2}, 2\pi\right]$.
(use the provided set of axes). Show clear readings on both axes. [3]



2. Sketch $y = \sin^{-1} x$ [3]

3. Sketch $y = \tan \frac{\pi x}{2}$, on the interval $[-2, 2]$. [4]

4. Sketch $y = 1 - \sec 2x$, on the interval $[-\pi, \pi]$. [4]

5. Sketch $y = 3 \sin\left(x + \frac{\pi}{4}\right)$, on the interval $[-\pi, 2\pi]$.

[4]