

Final Exam
FMTH004: BASIC MATHEMATICS-II
Fall-T1 2024

Points of attention:

- For each question, the maximum earned points are mentioned between brackets at the end of each question.
- Write very clearly! Answers that are not readable are not marked and don't get points!
- Make sure your answers are written to the point.
- All answers must be written **in English**.
- Write all the answers **in blue or black pen only**.
- When finished, submit the question paper, together with the answer scripts and the signed cover page to the invigilator.
- Cheating / copying is not allowed and will result in failing the exam.

Exam Duration: 2 hours
Instructor's Name: Muhammad Kazam Razaq
Exam Date: 17/11/2024
Program: FND

	40
	10

Student Information

Name: ID:
Signature:

Invigilator

Initials: ☐ Student ID checked
Time received:

Question 1.**[5 marks]****State whether each statement is True or False.**

- a. The slope of vertical line is 0. _____
- b. Two lines are parallel to each other if and only if $m_1 m_2 = -1$ _____
- c. If $\tan \theta = \frac{3}{4}$, then $\sin \theta = \frac{3}{5}$ _____
- d. The reference angle for the angle 135° is 45° . _____
- e. The solution of the inequality $3 \leq x - 1 < 4$ is $[4, 5)$. _____

Question 2.**[5 marks]**

Circle the correct option to fill in the blanks.

1. The y- intercept of the equation $x^2 - y^2 = 1$ is _____.
a. -1 b. 1 c. ± 1 d. no y- intercept
2. The slope of the line passing through $A(-2, 7)$ and $B(1, -2)$ is _____.
a. 3 b. -3 c. 0 d. -9
3. If $\tan \theta > 0$ and $\sin \theta < 0$, then θ lies in the _____ quadrant.
a. I b. II c. III d. IV
4. $\frac{\pi}{4} \text{ rad} =$ _____
a. 45° b. 90° c. 120° d. 150°
5. If $b^2 - 4ac < 0$, then the equation has _____ real solutions.
a. no b. 1 c. 2 d. many

Question 3.**[5 marks]**

Determine all the real solutions of the equation given below.

$$x = \frac{3}{x} + \frac{1}{2}$$

Question 4.**[4 marks]**

Solve the inequality given below. Express the solution using interval notation and graph the solution set.

$$3x^2 - 3x \geq 2x^2 + 4$$

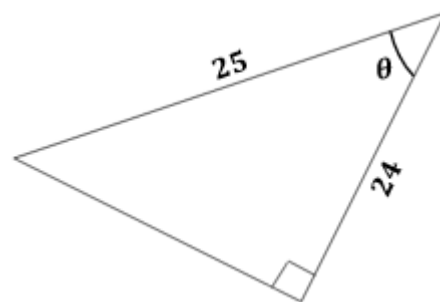
Question 5.**[3 marks]**

Determine the indicated trigonometric ratios of the angle θ for the triangle given below.

a. $\cos \theta$

b. $\tan \theta$

c. $\csc \theta$



Question 6.**[2 marks]**

Find the exact value of the trigonometric function given below.

$$\cos 240^\circ$$

Question 7.**[2.5 marks]**

Calculate the radius of the circle if an arc of length 20 cm on the circle subtends a central angle of 50° .

Question 8.**[4.5 marks]**

Test the equation given below for symmetry.

$$x^2 + 2xy + 3y^2 = 12$$

Question 9.**[5 marks]**

Find the length of each side of the triangle determined by the points given below. State whether the triangle is an isosceles triangle or a right triangle.

$$A(1, -1), B(7, -1), C(4, 5)$$

Question 10.**[4 marks]**

The angle of elevation of the top of a tree from a point on the ground 21 m from the base of the tree is 30° . Calculate the height of the tree.

Formula Sheet

$$(A + B)(A - B) = A^2 - B^2$$

$$(A + B)^2 = A^2 + 2AB + B^2$$

$$(A - B)^2 = A^2 - 2AB + B^2$$

$$(A + B)^3 = A^3 + 3A^2B + 3AB^2 + B^3$$

$$(A - B)^3 = A^3 - 3A^2B + 3AB^2 - B^3$$

$$A^3 + B^3 = (A + B)(A^2 - AB + B^2)$$

$$A^3 - B^3 = (A - B)(A^2 + AB + B^2)$$

Quadratic formula: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Distance formula: $d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$

Trigonometric table

θ°	$\sin \theta$	$\cos \theta$	$\tan \theta$
0	0	1	0
30°	$\frac{1}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{3}}{3}$
45°	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{2}}{2}$	1
60°	$\frac{\sqrt{3}}{2}$	$\frac{1}{2}$	$\sqrt{3}$
90°	1	0	<i>undefined</i>

Reference:

Stewart, J., Redlin, L. and Watson, S. (2017) *Precalculus Mathematics for Calculus*. 7th edn. Cengage.