

MEKELLE UNIVERSITY
COLLEGE OF NATURAL AND COMPUTATIONAL
SCIENCES
DEPARTMENT OF MATHEMATICS

**1. Mathematics for Natural Sciences (Math 1011) Individual
Assignment (10 %)**

1. Let $f(x) = 3x^2 + 4x + 2$ and $f(g(x)) = 12x^2 + 20x + 9$, find $g(x)$.
2. Solve the value of x , if $10^x + 10^{x-1} = 0.11$.
3. Given two equation of lines $l_1 : 3x - 6y + 1 = 0$ and, $l_2 : x - 2y = 3$ then find the distance between the two lines.
4. A line segments has ends $(1, 5)$ and $(-2, 4)$. Find the coordinates of the points that trisect the segments.
5. Suppose two lines $y = x$ and $y = x - 4$ are tangent to a circle at $(2, 2)$ and $(4, 0)$, respectively. Find equation of the circle.

**2. Mathematics for Natural Sciences (Math 1011) Group
Assignment (10 %)**

1. Show that the n n^{th} roots of unity are given by

$$(1)^{1/n} = \cos \frac{2k\pi}{n} + i \sin \frac{2k\pi}{n}, \quad k = 0, 1, 2, \dots, n-1$$

2. Consider the rational function $f(x) = \frac{2x^5 - 4x^4 - 6x^3}{x^5 - 3x^4 - 3x^3 + 7x^2 + 6x}$, then find
 - (a) the roots of the numerator and denominator.
 - (b) the domain of f and simplify it.
 - (c) x and y intercepts if any
 - (d) vertical asymptote/hole of f if any.
 - (e) horizontal asymptote of f if any.
 - (f) Sketch the graph of f .
3. Find the equation of the circle containing the points $(1, 2)$, $(2, -1)$ and $(4, 5)$.
4. Let the function $f(x) = \ln(e^x - 3)$,
 - (a) compute the domain of f
 - (b) compute f^{-1} and its domain
 - (c) sketch the graph of f and f^{-1}
5. $P(4, 6)$ is a point on a parabola whose **focus** is at $(0, 2)$ and **directrix** is parallel to x -axis.
 - (a) Find an equation of the parabola, its vertex and directrix.
 - (b) Determine the distance from P to the directrix.

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