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MTH100 Assignment 1 Solution (Maria Amin)

Fall 2026

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MTH100

Assignment No. 1 — Fall 2026 | Total Marks: 25

Section Incharge: Maria Amin

Question 1 (5 Marks)

The complex number Z is given by Z = (i − 1) / i. Find the modulus of Z.

Solution:

Multiply the numerator and the denominator by −i to remove i from the denominator.

Z = (i − 1)(−i) / i(−i)

Z = (1 + i) / 1

Z = 1 + i

For a complex number a + bi, the modulus is $\sqrt{(a^2 + b^2)}$.

$|Z| = \sqrt{(1^2 + 1^2)} = \sqrt{2}$

Question 2 (5 Marks)

Determine whether the function is even, odd, or none.

1. $f(x) = x^4 + 5x^2 + 3$

Put −x in place of x.

$f(-x) = (-x)^4 + 5(-x)^2 + 3 = x^4 + 5x^2 + 3$

f(−x) = f(x), so f is even.

2. $f(x) = x^2 + 3x$

$f(-x) = (-x)^2 + 3(-x) = x^2 - 3x$

f(−x) is not equal to f(x), and f(−x) is not equal to $-f(x) = -x^2 - 3x$.

So f is neither even nor odd.

Question 3 (5 Marks)

Express the quadratic polynomial $x^2 + 4x + 6$ in complete square form.

Solution:

Half of the coefficient of x is 2, and $2^2 = 4$.

$x^2 + 4x + 6 = (x^2 + 4x + 4) + 2$

$= (x + 2)^2 + 2$

Question 4 (5 Marks)

Evaluate.

1. $|(4 + 7i) / (-5 + 6i)|$

The modulus of a quotient is the quotient of the moduli.

$= |4 + 7i| / |-5 + 6i|$

$= \sqrt{(4^2 + 7^2)} / \sqrt{((-5)^2 + 6^2)}$

$= \sqrt{65} / \sqrt{61} = \sqrt{(65/61)}$

2. $|(2 + 2i) / (-5 + 3i)|$

$= |2 + 2i| / |-5 + 3i|$

$= \sqrt{(2^2 + 2^2)} / \sqrt{((-5)^2 + 3^2)}$

$= \sqrt{8} / \sqrt{34} = \sqrt{(8/34)} = \sqrt{(4/17)} = 2 / \sqrt{17}$

Question 5 (5 Marks)

Let f and g be the functions defined by $f(x) = 6x + 1$ and $g(x) = -9x + 5$. Find $f \circ g(x)$ and $g \circ f(x)$.

$f \circ g(x) = f(g(x))$

Put g(x) in place of x in f.

$= f(-9x + 5)$

$= 6(-9x + 5) + 1$

$= -54x + 30 + 1 = -54x + 31$

$g \circ f(x) = g(f(x))$

Put f(x) in place of x in g.

$= g(6x + 1)$

$= -9(6x + 1) + 5$

$= -54x - 9 + 5 = -54x - 4$