United International University
School of Science and Engineering
Mid- term Examination
Trimester: Spring - 2025
Course Title: Fundamental Calculus
Course Code: Math 1151 Marks: 30
Time: 1 Hour 30 Minutes

Answer all Questions

1. **a)** Draw the graph of following functions and find its domain and range. [5]

$$y = f(x) = \begin{cases} 2x + 7; & x \leq -2 \\ 3\ ; & -2 < x \leq 2 \\ x^2 - 1; & x > 2 \end{cases}$$

b) The graph of $f(x)$ is given below:

(i) On the same axis draw the graphs of $y = f(-x) + 1$ [2]

(ii) Explain the transformations used in $y = 2f(x - 1) - 3$ [3]

2. **a)** By drawing graph, identify whether each of the following functions are one-to-one or many-to-one? [4]

(i) $f(x) = 3e^x + 1$

(ii) $f(x) = |x + 1|$

b) Consider the function $f(x) = \sqrt{x - 3}; x \geq 3$.

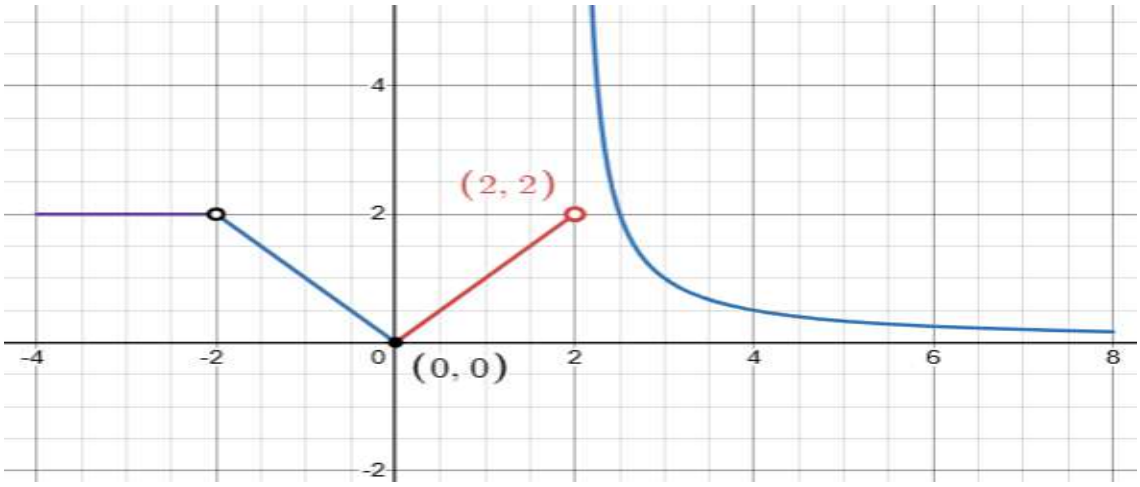
(i) Find $f^{-1}(x)$ and state its domain and range. [6]

(ii) Draw the graph of $y = f(x)$ and its inverse on the same diagram.

3. **a)** Determine whether the following functions are even, odd, or neither. [3]
(i)$f(x) = 3\sin x$ (ii) $f(x) = x^4 + x^2 + 1$ (iii) $f(x) = x^3 + 1$

b) Consider the functions $f(x) = 2x + 1$and $g(x) = x^2 + 3$,verify that [3]
$(fog)(x) \neq (gof)(x)$

c) [4]



Use the given graph of f to state the value of each quantity.

(i) $\lim_{x \to -2} f(x)$
(ii) $\lim_{x \to \infty} f(x)$
(iii) $\lim_{x \to 2} f(x)$ **and** $f(-2)$.