United International University

School of Science and Engineering

Mid Term Exam Trimester: - Spring 2022

Course Title: Fundamental Calculus

Course Code: Math 1151 Marks: 30 Time: 1 Hour 45 minutes

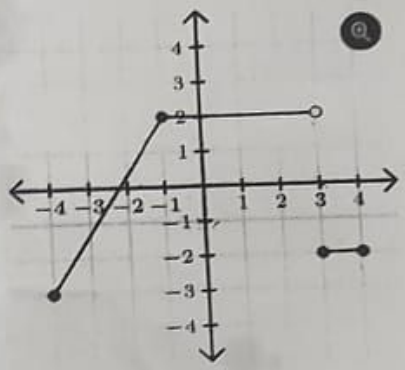
[Note that the number of marks is given in brackets at the end of each question or part question. You have to answer all the questions]

Q1

[5]

The graph of $y = f(x)$ is drawn. Using the graph

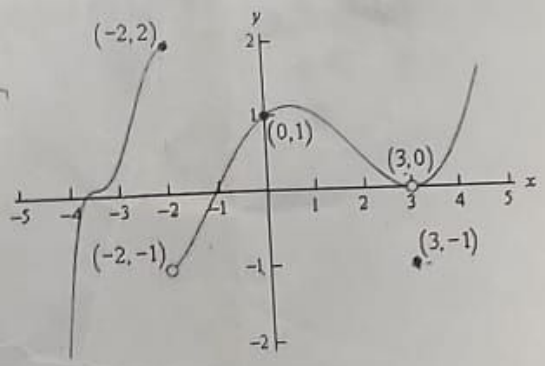
(i) Calculate $f(3)$
(ii) Calculate $f(-4)$
(iii) Test the continuity at $x = -1$



Q2

[4]

The graph of the function $y = f(x)$ is given:



From the figure write the answers of the following questions:

(i) $\lim_{x\to -2} f(x)$
(ii) $\lim_{x\to 3} f(x)$.

[3+2=5]

Q3

(a) Verify the following functions as even or odd or neither

(*i*) $f(x) = -2x^2 + 1$ (*ii*) $f(x) = \frac{1}{x-3}$ (*iii*) $f(x) = 3x^3 + 2$

(b) Identify the following functions as one to one or many to one function

(*i*) $y = |x|$ (*ii*) $y = \sqrt{x},\ x \geq 0$

Q4

The displacement of a particle is given by $f(t) = 3t^2 + 4t - 2$ for $0 \leq t \leq 4$. Find [4]

(i) The instantaneous rate of change of the particle at $t = 2$

(ii) The average rate of change over the period $0 \leq t \leq 4$

Q5

[4]

Find the inverse function of the following functions stating their domain and range

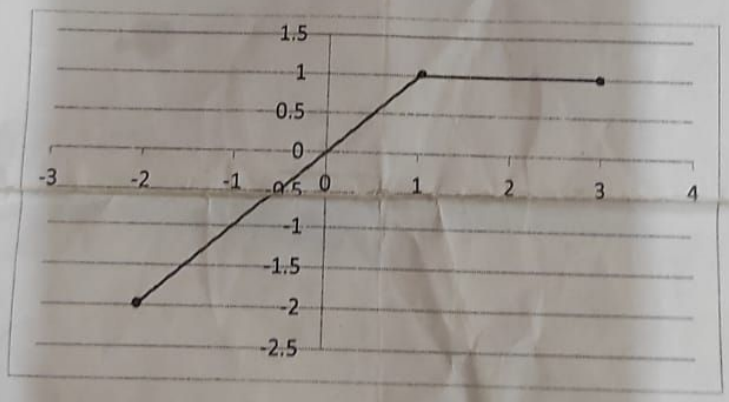
(i) $f(x) = \sqrt{\frac{2x-1}{3}},\ x \geq \frac{1}{2}$

(ii) $f(x) = 3x^3 + 5$ → graph

Q6

[8]

Use the accompanying graph of $y = g(x)$ to sketch the following functions:



(a) $y = 2g(-x)$

(b) $y = g(x + 3)$

(c) $y = -g(x) + 1$