

Daffodil International University  
 Department of Business Administration  
 Course Title: Differentiation and Integral Calculus  
 Course Code: 0541-214

Semester: Fall 2024  
 Time: 1 Hour 30 minutes  
 Section: All

Examination: Midterm Term  
 Full Marks: 25

Teachers' Initial: DMSA, Asmani, Ashad

[NB: Answer all the following questions]

|    |    |  |                  |
|----|----|--|------------------|
| 01 | a) | Define domain and range of a function  | (CLO 1, L 1) 2   |
|    | b) | Discuss marginal cost, marginal revenue, and marginal profit   | (CLO 1, L 2) 3   |
| 02 | a) | Sketch the graph of the function $y = 1 + x^2$   | (CLO 2, L 3) 2   |
|    | b) | Justify the relation $y = \frac{3}{1+x}$ is a function. Also find the domain and range.  | (CLO 2, L 3) 3   |
| 03 |    | Find $\frac{dy}{dx}$   |                  |
|    | a) | $y = (5x + 3)^5 + 6x^{\frac{2}{3}} + 10x^2 + 500$  | (CLO 2, L 3) 2.5 |
|    | b) | $y = e^{4x}(1 + x)^3$  | (CLO 2, L 3) 2.5 |
| 04 |    | The gross domestic product (GDP) of a certain country was $y = x^2 + 5x + 106$ billion dollars $x$ years after 2020. ✓   |                  |
|    | a) | At what rate was the GDP changing with respect to time in 2026?  | (CLO 2, L 3) 3   |
|    | b) | By how much will the GDP actually change during to the time in 2030?   | (CLO 2, L 3) 2   |
| 05 |    | $C(x) = \frac{1}{4}x^2 + 3x + 67$ is the total cost of producing $x$ units of a particular commodity and $p(x) = 9 - \frac{x}{5}$ is the price at which all $x$ units will be sold. Assume $p(x)$ and $C(x)$ are in dollars. | (CLO 2, L 3) 5   |
|    | a) | Find the marginal cost and the marginal revenue.   |                  |
|    | b) | Use marginal cost to estimate the cost of producing the fourth unit.   |                  |
|    | c) | Find the actual cost of producing the fourth unit.   |                  |
|    | d) | Use marginal revenue to estimate the revenue derived from the sale of the fourth unit.   |                  |
|    | e) | Find the actual revenue derived from the sale of the fourth unit.  |                  |