

## MTH 201 – Business Calculus: Midterm (21/4/2026)

**Full name:** ..... **TROY ID No.:** .....

**Q1.** Find any relative extrema of  $f(x) = e^x(x - 3)$ . State where the function is increasing or decreasing and determine points of inflection.

**Q2.** Find the absolute maximum and minimum values of the function  $f(x) = \frac{x}{9x^2 + 1}$  over  $[0; 2]$ .

**Q3.** The total cost and total revenue functions for a company are

$$C(x) = x^3 - 22x^2 + 96x + 310, \quad R(x) = x(171 - 2x).$$

- a) Write down the equation for the profit function  $P(x)$ . Hence determine the level of output,  $x$ , for which profit is maximized.
- b) Find the marginal revenue  $MR(x)$  and the marginal cost  $MC(x)$ . Verify that  $MR = MC$  when the profit function has a maximum value.

**Q4.** A rectangular box with a square base and a cover is to have a volume of  $875 \text{ cm}^3$ . If the cost per square cm for the bottom is \$4, for the top is \$3, and for the sides is \$4, what should the dimensions be in order to minimize the cost?