AdA

NORTH SOUTH UNIVERSITY

MAT 120 (Calculus I)

Final Examination, Section: 01, **Semester:** Summer 2020

Total marks: 20 **Time:** 1 hour.

Numbers in the right margin indicate full marks of questions: Marks

(Answer any FOUR questions from FIVE)

1. Use both the first and second derivative tests to find the relative maximum and minimum of the function $f(x) = x^3 - 3x + 3$. Identify the locations of the intercepts and inflection points. Discuss increasing, decreasing, concavity and show in graph. 5

2. Show that the radius of the right circular cylinder of greatest curved surface, which can be inscribed in a given cone is half that of the base of the cone. 5

3. Let R denote the region below the graph of $y = \sqrt{1 - x^2}$ and above the interval $[-1, 1]$.
   (a) Use a geometric formula to find the area of R.
   (b) What estimate results if the area of R is approximated by the total area within the rectangles using 8 subintervals? 5

4. Sketch the region whose area is represented by the definite integral, and evaluate the integral using (i) geometrical formula (ii) by integration.
   (a) $\int_{-1}^{2} (x + 2)\,dx$ (b) $2\int_{-2}^{2} \sqrt{4 - x^2}\,dx$. 5

5. Suppose that a particle moves on a coordinate line so that its velocity at time t is $v(t) = t^2 - 2t$ m/s. Find the (i) displacement and (ii) distance traveled by the particle during the time interval $0 \le t \le 4$. 5

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