NORTH SOUTH UNIVERSITY
MAT 120 (Calculus I)
Final Examination, Section: 04, Semester: Fall 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. A particle is moving along the curve whose equation is $\dfrac{xy^3}{1+y^2} = \dfrac{8}{5}$

Assume that the x-coordinate is increasing at the rate of 6 units/s when the particle is at the point (1, 2).   5

(a) At what rate is the y-coordinate of the point changing at that instant?

(b) Is the particle rising or falling at that instant?

2. Identify the locations of the intercepts, relative extrema, and inflection points of the function $y = x^3 - 3x + 2$. Then sketch the graph.

5

3. Let R denote the region below the graph of $f(x) = \sqrt{1 - x^2}$ and above the interval $[-1, 1]$.
(a) Use a geometric argument to find the area of R.
(b) What estimate results if the area of R is approximated by the total area within the   5
rectangles using 6 subintervals?

4. Find the area of the circle $x^2 + y^2 = a^2$ by integration.

5

5. Suppose that a particle moves on a coordinate line so that its velocity at time t is
$v(t) = t^2 - 4t$ m/s. Find the (i) displacement and (ii) distance traveled by the   5
particle during the time interval $0 \le t \le 10$.

--- --- ---   --- --- ---   --- --- ---