Math 221 Exam 2

July 28, 2017

Student's Name:

Instructor's Name:

Q.N.	1	2	3	4	5	Total
Points						

Show all work in detail for full credit. No books and calculators are permitted. Use the back page as a sketch paper.

1.

(a) (6 points) Draw the region bounded by the curves. Then, use the disk method to find the volume when the region is rotated around the x-axis.

$$f(x) = \sqrt{x}, \quad x = 0, \, x = 4 \quad and \quad y = 0.$$

(b) (6 points) Use shell method to find the volume generated when the region between the curves

$$y = \sqrt{x}, \quad y = x^2 \text{ rotated around y-axis.}$$

2.

(a) (6 points) Find the arc of length of function

$$f(x) = \frac{4}{3}x^{3/2} \text{ from } x = 0 \text{ to } x = 1$$

(b) (6 points) Find the surface area of the volume generated when the curve $y = x^2$ revolves around the y-axis from $(1, 1)$ to $(3, 9)$.

3 (12 points). Find the work required to pump all the water out of a cylinder that has a circular base of radius $5ft$ and height $200ft$. Use the fact that the density of water is $62\,lb/ft^3$.

4. (12 points) Let R be the region bounded above by the graph of the function $f(x) = x^3$ and below by the x-axis from from $x = 0$ to $x = 3$. Find the centroid of the region.

5.

(a) (6 points.) Find the derivative: $\frac{d}{dx}(tanh^{-1}x)^2$

(b) (6 points.) Determine the limit of the sequence or show that the sequence diverges. If it converges, find its limit.

$$a_n = (1 - \frac{2}{n})^n$$