Review Problems for Exam I
MATH 155 Section 08
October 6th, 2015. 7:35PM–9:25PM

Review Problems

1. Let R be the region bounded by the x-axis, y-axis, and the function $y = \sin x$. Find the volume of the solid generated when R is revolved about the x-axis. (Hint: $\sin^2 x = \frac{1}{2}(1 - \cos 2x)$)

2. Find the arc length of the curve given by the function $y = \frac{x^{3/2}}{3} - x^{1/2}$ on $[4, 16]$ by integrating with respect to x.

3. For the function $y = \sqrt{-x^2 + 6x - 5}$ on $[2, 3]$, find the area of the surface of revolution obtained by revolving the graph about x-axis.

4. How much work is needed to pump all water out of a cylindrical tank with a height of 8 m and radius of 2 m. The water is pumped to an outflow pipe 10 m above the bottom of the tank. Use the density of water ρ, the gravitational acceleration g as given constants.

5. For the function $f(x) = x^3$, find the slope of the tangent line on the point $(8, 2)$ of f^{-1}.

6. Calculate the following integral:
$$\int \frac{\sec^2 x}{\tan x} dx.$$

7. Calculate the following integral:
$$\int_0^3 \frac{1}{\sqrt{36 - x^2}} dx.$$

8. Evaluate the limit:
$$\lim_{x \to 0^+} \sin x^{\tan x}$$

9. Calculate the following integral:
$$\int_2^4 \frac{x^2 + 2}{x - 1} dx.$$

10. Calculate the following integral:
$$\int x^2 (\ln x)^2 dx.$$