Spring 2003

Recitation Instructor:

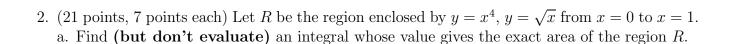
No.	1	2	3	4	5	6	Total
score							

1. (27 points, 9 points each) Evaluate each of the following integrals (You must show all of your work to receive full credit. Here, no calculators allowed).

a.
$$\int \frac{\sin x}{3 + \cos x} dx$$

b.
$$\int_{1}^{e} \frac{(\ln x)^{7}}{x} dx$$

c.
$$\int \frac{1}{\sqrt{x}} \sec^2 \sqrt{x} \ dx$$



b. Find (but don't evaluate) an integral whose value gives the volume of the solid obtained by revolving the region R about the x-axis, By using the method of slicing.

c. Find (but don't evaluate) an integral whose value gives the volume of the solid obtained by revolving the region R about the y-axis, By using the method of cylindrical shells.

3.	(21 points, 7 points each) A tank has a square base whose length is 5 feet and rectangular sides of height 3 feet. Assume that the tank is filled with water weighing $\rho = 62.5 \ lb/ft^3$.
	a. Find a Riemann sum whose value approximates the work required to pump all of the water over the top of the tank.
	b. Write down but do not evaluate an integral whose value is exactly the work required to pump all of the water over the top of the tank.
	c. Write down but do not evaluate an integral whose value is exactly the force exerted by the water on one side of the tank.

4. (8 points) Find $f^{-1}(x)$ if $y = f(x) = 4 + 3e^{2x}$.

5. (14 points) This question deals with the function $f(x) = 2x^3 + 5x - 1$. a.(4 pts.) Show that f^{-1} exists.

b. (10 pts.) Find the equation of the tangent line to the function $y = f^{-1}(x)$ at the point (6, 1).

6. (8 points) Let y(t) be the amount of radioactive element present at time $t \ge 0$, and assume that y(t) satisfies the equation: $\frac{dy}{dt} = -0.3y$. Write down the exact form of y(t) and find the half life of the radioactive element.