Math 107-Sec 510, Summer '03 **Exam 1** **Score:** _____

Name: _____ **TA's Name:** _____

Instructions: You must show supporting work to receive full and partial credits. No text book, notes, formula sheets allowed.

1. (27 points, 9 points each) Evaluate each of the following integrals **(No calculators allowed on this problem).**

   (a) $\int \frac{x^2}{\sqrt{x+3}} dx$

   (b) $\int_0^2 x^2 e^{x^3} dx$

   (c) $\int \frac{1}{x(\ln x)^2}\, dx$

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2. (24 points, 8 points each) Let R be the region enclosed by $y = x^2$, $y = 2x$.
(a) Find **(but don't evaluate)** an integral whose value gives the exact area of the region R.

(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, **using the method of washers.**

(c) Find **(but don't evaluate)** an integral whose value gives the volume of the solid obtained by revolving the region R about the vertical line $x = -1$, **using the method of cylindrical shells.**

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3. (14 points, 7 points each) The Great Pyramid at Gizeh is 500 feet high rising from a square base of side 750 feet. Assume that the stone making up the pyramid weighs 200 ponds per cubic foot.

(a) Find a Riemann sum whose value approximates the total amount of work done in building the pyramid.

(b) Write down **but do not evaluate** an integral whose value is exactly the total amount of work done in building the pyramid.

4. (10 points) An underwater viewing window is a disc of radius 6 inches, with its top 8 feet below the surface of an aquarium. Write down **but do not evaluate** an integral whose value is the total hydrostatic force that the viewing window has to sustain.

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5. (25 points, 5 points each) The following table gives some values of a function $y = f(x)$ on the interval $[0, 1.2]$:

x	0	0.2	0.4	0.6	0.8	1.0	1.2
f(x)	0	0.2	0.4	1.0	1.6	2.0	2.2

Approximate the value of the integral $\int_0^{1.2} f(x)dx$ by the following Riemann sums:

(a) The left point sum L_3

(b) The right point sum R_3

(c) The midpoint sum M_3

(d) The trapezoid sum T_3

(e) The Simpson sum S_3

2 Bonus Points: Dr. Deng's office is on the __th floor of _____ Hall. (... *The End*)