Name_____

T.A. name_____

Section time_____

Mathematics 16B
R.Hartshorne   (This test is
Hour Exam   on both sides
Wednesday, 10/30/96   of this page.)

Part I. *Show your work and put your answers in the box.*
5 points each. No partial credit. Calculators not allowed.

1. $\int x(3x^2+1)^3 dx$.

2. $\int x^2 e^{x^3} dx$.

3. $\int \dfrac{x-1}{\sqrt{3x^2-6x+9}}\, dx$.

4. $\int \tan 2x\, dx$.

5. $\int x\sin(x^2)dx$.

6. $\int (lnx)^2 dx$.

7. $\int_5^{13} x\sqrt{x^2-25}\, dx$.

8. $\int_1^e \dfrac{\ln x}{x}\, dx$.

9. $\int_5^{\infty} \dfrac{1}{(2x-3)^2}\, dx$.

10. $\int_{-\infty}^0 e^{4x} dx$.

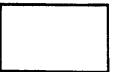**Part II.** *10 points each. Show your work. Put answers in boxes.*

1. Compute the integral $\int_0^{\frac{1}{3}} x \sin \pi x \; dx$. Express your answer using π and square roots. Calculator not allowed.
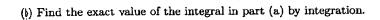
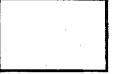2. Use the fact that the area of a circle of radius r is πr^2 to find the value of the following integral.
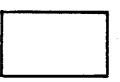   Express your answer in terms of π. Calculator not allowed.

$$\int_3^6 \sqrt{6x - x^2} \; dx$$

3. (a) Use the trapezoidal rule with $n = 3$ to approximate the integral $\int_1^4 (2x - 3)^3 dx$.

   (b) Find the exact value of the integral in part (a) by integration.

4. A rich uncle leaves you an inheritance which will generate a continuous stream of income at the rate of $5,000 per year for the rest of your life. Find the present value of this income stream over the next 50 years, assuming an interest rate of 6%. Express your answer to the nearest cent.

5. Find the total area bounded by the curve $y = x\sqrt{4 - x^2}$ and the x-axis.

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