

Math 122D

THIRD HOUR EXAM

NAME _____

General Notes:

1. Show work.
2. Look over the test first, and then begin.
3. No calculators on this exam.

Friday, Nov. 11, 2005
100 pts.

I. Work, fluid pressure, and such

1. (15 pts.) The cross section of a trough is a right triangle with top 5', depth 10', and length 10'. If it is filled with water ($\rho = 62.4 \text{ lb/ft}^3$) how much work is involved in pumping the water out?

2. (15 pts.) What is the centroid of a right triangle with base 10 and height 5? Model this by considering the function $y = \frac{x}{2}$ bounded by $x=0$, $x=10$, and the x axis.

II. Integration problems. In each of the following evaluate the indefinite integral. Don't forget the constant of integration.

1. (10 pts. each) Integrals involving trig functions

a. $\int \sin^2 x \cos^2 x dx$

b. $\int \sin x \cos x dx$

2. (10 pts. each) Integration by parts

a. $\int e^x \sin x dx$

b. $\int \ln(x) dx$

3. (10 pts.) Partial fractions

$$\int \frac{dx}{x^2 - 1} \quad (\text{hint: factor the denominator})$$

4. (10 pts. each) Using any technique that appears appropriate

a. $\int \frac{dx}{e^x}$

b. $\int \frac{dx}{\sqrt{4-x^2}}$