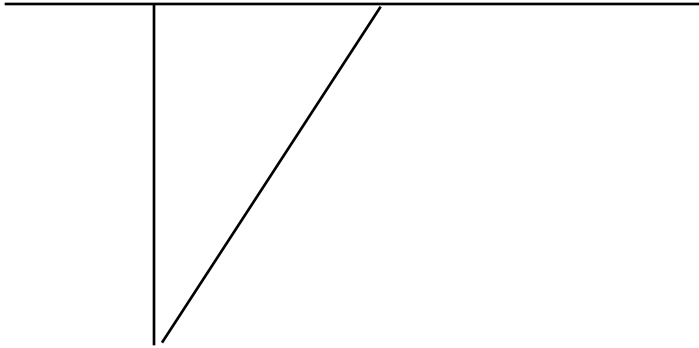# Math 122C

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.) A triangular sheet having the form of a right triangle with base 5' and depth 10' is placed just at water level ($\_$ = 62.4 lb/ft^3) with the base of the triangle at the water line (see picture). What is the total force against the plate?

2. (15 pts.)   An organization has initially 100 members. The retention rate of members is given by $e^{-0.2t}$ (the fraction remaining after t months). Members are added at the rate of 10/month. How many members will the organization have at the end of a year (12 months)?

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. $\int \sin^3 x \cos^5 x \, dx$

    b. $\int \tan^4 x \sec^2 x \, dx$

2.   (10 pts. each) Integration by parts

a. $\int x^2 e^x dx$

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

3. (10 pts.) Partial fractions

$$\int \frac{dx}{x^2 - 2x - 3}$$ (hint: factor the denominator)

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

a. $\int \dfrac{dx}{1+e^{-x}}$

b. $\int \dfrac{dx}{4+x^2}$