MATH 31B, LECTURE 4
MIDTERM 2
MAY 18, 2012

Name:_____

UID:_____

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Discussion meets: (circle one)   Tuesday   Thursday

Instructions: The exam is closed-book, closed-notes. Calculators are not permitted. Answer each question in the space provided. If the question is in several parts, carefully label the answer to each part. Do all of your work on the examination paper; scratch paper is not permitted. If you continue a problem on the back of the page, please write "continued on back".

Each problem is worth 20 points.

Problem	Score
1	
2	
3	
4	
5	
Total	

Problem 1:

(a) Evaluate the indefinite integral: $\displaystyle\int \tan^2 x \sec^6 x\ dx$

(b) Evaluate the indefinite integral: $\displaystyle\int \frac{\arctan x}{(1+x^2)^{3/2}}\ dx.$
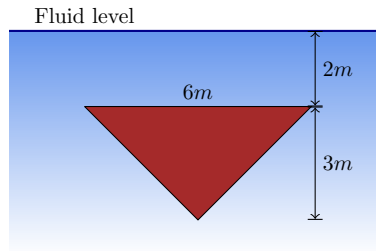
Problem 2:

(a) Evaluate the improper integral: $\int_1^\infty \frac{x+1}{x^4+x^2}\,dx$.

(b) Use the comparison test to determine if the improper integral converges: $\int_0^\infty \frac{2x\cos^2 x}{7x+5x^3}\,dx$

Problem 3:

(a) Find M_4 and S_4 for $\displaystyle\int_2^4 e^x \, dx$ (you do not need to simplify your expressions).

(b) Does M_4 give an overestimate or underestimate of the integral?

(c) Compute the error bound for S_4.

Problem 4: Find the pressure on the triangular plate in the figure below, submerged in a fluid of density $\rho = 200 \ kg/m^3$. The top of the plate is parallel with the surface of the fluid, and is at a depth of 2 meters below the surface. Assume $g = 9.8 \ m/s^2$.

Fluid level

6m

2m

3m

Problem 5:

(a) Find the Taylor polynomials $T_n(x)$ for $f(x) = \frac{1}{x}$, centered at $a = 1$.

(b) Compute the error bound for $|f(2) - T_n(2)|$.

(c) Find $|f(2) - T_{1000000}(2)|$.