

V1011.011 Fall 2009
Calculus II – Summer 2011

Sample Midterm

Instructions: You have 95 minutes to complete the exam. Calculators and textbooks are not allowed. Provide the answers in the simplest possible form that does not require calculator use. (E.g. expressions like $\sqrt{13}$ are fine.) Show all of your work: if you only give the answer you will receive no credit, but conversely, partial credit will be given for partial solutions.

Write your solutions in the space below the questions. If you need more space use the back of the page. Do not forget to write your name in the space below.

Name: _____

Question	Points	Score
1	20	
2	15	
3	20	
4	15	
5	25	
6	10	
7	15	
Total:	120	

Problem 1.

Evaluate the following integrals.

(a) [5pts.] $\int \frac{\ln t}{\sqrt{t}} dt$

(b) [5pts.] $\int \tan^3 x \sec^3 x dx$

(c) [10pts.] $\int \frac{1}{\sqrt{5-u^2+4u}} du$

Problem 2. *15pts.*

Compute the following integral.

$$\int \frac{2x^2 - x + 1}{(x - 1)(x^2 + 1)} dx$$

Problem 3.

(a) [10pts.] Show that $\int \sqrt{1+x^2} dx = \frac{x}{2}\sqrt{1+x^2} + \frac{1}{2} \ln(x + \sqrt{1+x^2}) + C$

(b) [10pts.] Find the length of the arc of the parabola $y = \frac{1}{2}x^2$ from $(0, 0)$ to $(2, 2)$.

Problem 4. *15pts.*

Find the volume of the solid generated by rotating the region bounded by $y = \ln x$, $y = 0$, and $x = \epsilon$ (for $0 < \epsilon < .5$) about the line $x = 3$.

Problem 5.

- (a) [10pts.] Find the area of the region bounded by the curves

$$y = \left| \cos\left(\frac{\pi x}{2}\right) \right| \text{ and } y = 1 - x.$$

- (b) [15pts.] Find the volume of the solid generated by rotating the region in (a) about the y -axis.

Problem 6. *10pts.*

Evaluate

$$\int_{\frac{\pi}{4}}^{\pi} \tan(x) dx$$

if possible.

Problem 7. *15pts.*

Determine whether the following integral is convergent or divergent. Explain why. If you use a theorem, quote the theorem precisely and check whether the hypotheses of the theorem are satisfied before applying it.

$$\int_2^{\infty} \frac{1}{\sqrt{x^4 + 1}} dx$$