

Math 132, Exam 2, Makeup
Fall 2002

Name: _____

Section: _____

ID number: _____

- No papers or notes may be used, but you can use your calculator.
- Please don't just give an answer. Clearly explain how you get it.
- This is a 2 hour exam.

Problem	Grade
1a	
1b	
2a	
2b	
3	
4	
5	
6	
7	
Total (out of 90)	

1a) [10 points] Evaluate the definite integral

$$\int_0^{\pi/3} 5x \cos(3x) dx$$

1b) [10 points] Show that:

$$\int \frac{1}{\sqrt{x^2 + 1}} dx = \ln(x + \sqrt{x^2 + 1}) + C$$

Hint: Use trigonometric substitution.

2a) [10 points] Determine if the following improper integral is divergent or convergent. Evaluate it, if it is convergent.

$$\int_1^{\infty} \left(x e^{-x} + \frac{1}{x^4} \right) dx$$

2b) [10 points] Determine if the following improper integral is divergent or convergent. Evaluate it, if it is convergent.

$$\int_0^2 \frac{1}{(1-x)^2} dx$$

- 3) [10 points] For the parametric curve: $x(t) = 2e^t$, $y(t) = \sqrt{1+t}$ with $t \geq -1$:
- Find the equation of the tangent line at $t = 0$.
 - Does the curve have horizontal tangent(s) ? If yes, find the equation of the horizontal tangent(s).

4) [10 points] Find the length of the curve $x(t) = 5 \sin(t^2)$, $y(t) = 5 \cos(t^2)$, from $t = 0$ to $t = \pi/4$.

- 5) [10 points] Consider the curve given in polar coordinates by the expression $r = 1 - \cos \theta$.
- Sketch the curve with this equation.
 - Find the area enclosed by the curve.

6) [10 points] Calculate the area enclosed by the curves $r = 1$ and $r = e^\theta$, between $\theta = 0$ and $\theta = \pi/4$.

7) [10 points] Show that the parametric curve $x(t) = \cos(t)$, $y(t) = \tan(t)$, for $0 < t < \pi/4$ corresponds to a Cartesian equation of the form:

$$y = \frac{\sqrt{1-x^2}}{x}$$