PRACTICE MIDTERM 1

PLEASE NOTE:

The midterm will be in room 2160E Dickson, NOT the usual classroom.

Instructions.

Please show your work. You will receive little or no credit for an answer not accompanied by appropriate explanations, even if the answer is correct. If you have a question about a particular problem, please raise your hand and one of the proctors will come and talk to you.

Calculators or computers of any kind are not allowed. You are not allowed to consult any other materials of any kind, including books, notes and your neighbors. You will find a list of some useful formulas on page 2 of the exam.

At the end of the exam, please hand the exam paper to your TA. Please be prepared to show your university ID upon request.

If you have a question about the grading of a particular problem, please come and see me or one of the TAs *within 14 days of the exam*.

#1	#2	#3	#4	#5	Total

$$\cos^2 t + \sin^2 t = 1 \qquad \sin 2t = 2\sin t \cos t$$

$$\sin^2 \tfrac{t}{2} = \tfrac{1-\cos t}{2} \qquad \cos^2 \tfrac{t}{2} = \tfrac{1+\cos t}{2}$$

$$\cos 2t = \cos^2 t - \sin^2 t \qquad \frac{dy}{dx} = \frac{\frac{dy}{dt}}{\frac{dx}{dt}}$$

$$L = \int_a^b \sqrt{\left(\tfrac{dx}{dt}\right)^2 + \left(\tfrac{dy}{dt}\right)^2}\, dt \qquad A = \int_a^b \tfrac{1}{2}[f(\theta)]^2 d\theta$$

$$\overrightarrow{v} \cdot \overrightarrow{w} = \|\overrightarrow{v}\|\|\overrightarrow{w}\| \cos\theta \qquad \|\overrightarrow{v} \times \overrightarrow{w}\| = \|\overrightarrow{v}\|\|\overrightarrow{w}\| |\sin\theta|$$

Problem 1. Find an equation of the plane through the points $(1,1,1)$, $(0,1,1)$ and $(-1,-1,-1)$.

Problem 2. (a) Prove that the vectors $\langle 1,4,7\rangle$, $\langle 2,5,8\rangle$ and $\langle 3,6,9\rangle$ are parallel to the same plane. (b) Find an equation of such a plane. (c) Which room will the midterm exam be in? (Hint: see the class web page!)

Problem 3. Let Cbe the parametric curve $x = \sin t$, $y = 3\cos t$. Sketch this curve. Find all points on the curve at which the tangent line to the curve is parallel to the line $y = x$. Where is Dickson, anyway? (Hint: it's near the sculpture garden).

Problem 4. Find an equation in polar coordinates that describes the line $y = 3x + 1$.

Problem 5. For which values of c is the following curve an ellipse, and for which values is it a hyperbola: $x^2 + cy^2 + 2\sqrt{|c|}y - 1 = 0$? Sketch the curve for $c = 1, -1, 0$.