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Name _____

Math 211 – Exam II – 90 minutes – Tuesday Oct 28, 2003

Circle your section:

301 Lopes 7:45 TR B329 Van Vleck
302 Lopes 8:50 TR 4322 Soc Sci
305 Petro 9:55 TR 14 Ingrahm
306 Petro 11:05 TR 310 Ed Sci
309 Vasquez 12:05 TR 348 Birge
310 Vasquez 1:20 TR 228 Education
313 Galindo 2:25 TR B123 Van Vleck
314 Galindo 3:30 TR B333 Van Vleck

I	20 Points	
II	30 Points	
III	25 Points	
IV	30 Points	
V	30 Points	
VI	30 Points	
VII	20 Points	
VIII	15 Points	
Total	200 Points	

SHOW YOUR REASONING.

I. (20 points.) Complete the following definitions:

(a) A function $f(x)$ is said to be **continuous** at $x = a$ iff

(b) The **derivative** $f'(a)$ of the function $f(x)$ at the point $x = a$ is defined by

II. (30 points.) State and prove the formula for the derivative of the product of two functions. In your proof you may use (without proof) the limit laws, the theorem that a differentiable function is continuous, and high school algebra.

III. (25 points.) Two cars start from the same intersection at the same time. Car A heads east at a constant speed of 40 miles per hour. Car B heads north at a constant speed of 30 miles per hour.

(a) How far apart are they at the end of 1 hour?

(b) How fast is the distance between them changing at that time?

IV. (30 points.) In each of the following find dy/dx .

(a) $y = \frac{x}{e^x + 1}$.

(b) $y = \ln(e^x + e^{-x})$.

(c) $y = \left(\frac{x-1}{x+1}\right)^{3/2}$.

V. (30 points.) A graphic artist is designing a poster which is to have margins of 2 inches at the top and along each side and a 3-inch margin at the bottom. She wants the total area to be as small as possible, but the printed area (the part inside the margins) has to be 180 square inches. What dimensions will minimize the total area? Be sure to verify that the dimensions you find give the minimum.

VI. (30 points.) Find the following indefinite integrals.

(a) $\int (1 - t^2)^2 dt$

(b) $\int t^3 \sqrt{t^4 + 1} dt$

(c) $\int \frac{dt}{t \ln t}$

VII. (20 points.) Let $y = y(x)$ be the function defined implicitly by the equation $x^3 + y^3 = 9xy$.

(a) Find dy/dx in terms of x and y .

(b) Find the equation of the tangent line to the graph $y = y(x)$ at the point $(2, 4)$.

VIII. (15 points.) Use linear approximation to estimate $(997)^{1/3}$.