Math 122C

SECOND HOUR EXAM

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General Notes:

- Show work.
 Look over the test first, and then begin.
 No calculators on this exam.

Friday, Oct 21, 2005 100 pts.

I.	Differential	equations
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1. (10 pts.) Find a family of solutions to the differential equation xdy = ydx. Verify that your solution is correct.

- II. Mean Value Theorem
- 1. (10 pts.) Verify the mean value theorem for integration for the function $y = x^2$ for $1 \le x \le 2$. Your answer should be a number in the interval.

- III. Numerical analysis
- 1. (15 pts.) Use the trapezoid rule with n = 2 to approximate $\int_{0}^{1} x^{2} dx$. Carry your answer to the point where only numbers remain.

2. (10 pts.) The error term for the trapezoid rule is $\frac{(b-a)^3}{12n^2}M$ where M is the maximum value of the second derivative on the interval [a, b]. How large should n be so that the error is less than 0.01?

IX	Volumes
ΙV	voillines

1. (15 pts.) The area between the curves y = x and $y = x^2$ is rotated about the y axis. Use the method of shells to compute the volume of the resulting solid.

III. Polar coordinates

- 1. (10 pts.) Convert
 - a. Polar coordinates $(2, \pi/6)$ to rectilinear (x,y) coordinates.

b. Rectilinear coordinates (1, $\sqrt{3}$) to polar coordinates.

2. (10 pts.) Use integration in polar coordinates to find the area enclosed by $r = 2*Cos(\theta)$ for $0 \le \theta \le \frac{\pi}{2}$..

- VI. Arc length and surface area. In the following carry out your work to the point that only the integration is left to do.
- 1. (10 pts.) Find the arc length of the curve $y = x^2$ for $0 \le x \le \frac{\pi}{2}$

2. (10 pts.) Find the surface area generated by curve $y = x^2$ for $0 \le x \le \frac{\pi}{2}$ rotated about the x-axis.