The Final Exam For Cal II Dec.10/2003.

Problems 2,7,9 and 10 , 20 points and the rest each 10 points.Note there are 16 problems.

1.Sketch the region enclosed by the curves $y = \sqrt{(2-x)}, y = -x$ and $x - axis$, then find its area.

2.Find the volume of the solid that results when the region enclosed by the curves $y = x^{\frac{3}{2}}, x = 4$ and x-axis rotates about (a) x-axis (b) y-axis.

3.A cylindrical tank of radius 5 ft and height 9 ft is two-thirds filled with water. Find the work required to pump the water over the upper rim.(The weight density of water is 62.4 lb/ft^3.)

4.Find the exact arc length of the parametric curve

$$x = \cos(t) + t\sin(t), y = \sin(t) - t\cos(t), 0 \leq t \leq \pi$$

5.Evaluate the integral $\int_0^{\frac{\pi}{2}} sin^2 x cos^3 x dx$.

6.Evaluate the integral $\int_0^{\frac{\pi}{2}} tan^2(\frac{x}{2})dx$.

7.Use integration by parts to find the integrals (a) $\int x^2 lnx dx$ and (b)$\int x^2 e^x dx$.

8.Find the integral $\int \frac{x^4+6x^3+10x^2+x}{x^2+6x+10}dx$.

9.Decide the convergence or divergence of the following improper integrals:

(a) $\int_1^\infty \frac{(lnx)^2}{x}dx$. (b) $\int_0^\infty \frac{1}{1+4x^2}$. dx

10.Decide whether the following infinite series converge or diverge. Justify your answer in each case and state the test that you are using.

(a)$\Sigma_{k=1}^\infty \frac{1}{k^k}$. (b)$\Sigma_{k-1}^\infty \frac{e^k}{k!}$.

11.Find the sum of the series $\Sigma_{k-1}^\infty(\frac{4}{3^k} - \frac{2}{4^{k-1}})$.

12.Decide whether the series $\Sigma_{k-1}^\infty \frac{(-1)^{k+1}2k}{k^2+1}$ converges absolutley , conditionally or is divergent.

13.Find the interval of convergence of the power series $\Sigma_{k-1}^\infty \frac{5^k(x-1)^k}{k^2}$.

14.Find Taylor series of $f(x) = e^x$ at $x_0 = 1$ and find the interval of its convergence.

15.Let $f(x) = \frac{1}{1-2x}$. Find the Maclaurin series of functions $f(x)$and $f'(x)$. State the results using sigma notation.

16.Find the area of the region outside the cardiod $r = 2 - 2cos\theta$ and inside circle $r = 4$.