MA 126 (Calculus-II) Final exam
Show your work. Fri, Dec 9, 2005

1. Find the length of the curve $y = 2\sqrt{x^3}$ between the points $(0, 0)$ and $(1, 2)$.

2. Write Maclaurin series for $y = \ln(1-x^2)$ and $y = \cos(4x)$. Then use multiplication find first **three** nonzero terms for the Maclaurin series of the function $y = \ln(1 - x^2)\cos(4x)$.

3. Describe the surface given by equation

$$\rho = 2\sin\phi\sin\theta + 4\sin\phi\cos\theta - \cos\phi$$

(First, rewrite this equation in terms of x, y, z.)

4. Evaluate the indefinite integral $\int e^{-5x}\cos 2x\,dx$. (Work this integral, do not just give an answer.)

5. (a) Find the equation of the plane through the points $A(2, -1, 1)$, $B(4, 0, -3)$ and $C(0, -2, 0)$.
(b) Find the area of the triangle ABC.

6. Evaluate the indefinite integral

$$\int \frac{x^2 + x - 4}{x^3 + 4x}\,dx.$$

7. Two planes are given: $x = y + 2z - 2$ and $z = x - 2y + 2$.
(a) Find **parametric equations** and **symmetric equations** for the line of intersection of these planes.
(b) Determine the angle between these planes.

8. Determine whether the improper integral

$$\int_1^\infty \frac{e^x}{(e^x - 1)^{4/3}}\,dx$$

converges or diverges. If it converges, compute its value.

9. Determine if the following series converges:

$$\sum_{n=0}^{\infty} \frac{(-1)^n n}{n^2 + 5n + 4}$$

If it does, then does it converge absolutely?

10. Find first **four** nonzero terms of the Maclaurin series for the function $y = \sqrt[4]{(1-8x)^3}$.

[Bonus] Find the distance between skew lines

$$\frac{x+1}{2} = \frac{y-3}{-1} = \frac{z+1}{0}$$

and

$$\frac{x}{-3} = \frac{y+1}{2} = \frac{z-5}{1}$$