Math 2000: Assignment #6, Due March 8 2006

1. A Professor lost his calculator. Help him or her to find an approximate values of $\ln(1.5)$ and $\ln(0.5)$ using the Taylor expansion

$$\ln|1+x| = \sum_{k=1}^{\infty} (-1)^{k+1} \frac{x^k}{k}.$$

How many terms do you need in each case to find 3 correct digits of the numbers.

2. Estimate the range of values of x for which the approximation $\sin x \approx x - \frac{x^3}{6}$ is accurate to within the error 0.0001 ?

Graph both functions on the same Figure to support your statement.

3. Find and sketch the domain of the function

a) $F(x,y) = \sqrt{x-y}$

b) $F(x,y) = \sqrt{x-y}\ln(x+y)$

c) $F(x,y) = \sqrt{x^2+y^2-16}$

d) $F(x,y) = \ln(4-x^2-y^2)$

e) $F(x,y) = \dfrac{3x+y}{3x-y}$

f) $F(x,y) = \arcsin(x+y)$

4. For given function sketch the level curve $F(x,y) = 1$, the counter map of the function and the graph of the function. Give the name or a word description of the surface (like "This is a plane", "This is a paraboloid ", or "That is bizarre..." etc).

a) $F(x,y) = 4x^2 + y^2 + 1$

b) $F(x,y) = 1 - x - y$

c) $F(x,y) = -2$

d) $F(x,y) = y$

e) $F(x,y) = 1 + \cos x$

f) $F(x,y) = -4x^2 - y^2 + 2$