MATH 22005 HOMEWORK #3 (20 pts) SPRING 2006
SHOW ALL WORK FOR FULL CREDIT — PLEASE CIRCLE FINAL ANSWER

DUE: TUESDAY, FEBRUARY 14, 2006 AT THE BEGINNING OF CLASS
NO EXCEPTIONS!!!!

1. (2 pts each) Find the limit of each function.

   (a) $\lim\limits_{(x,y)\to(0,0)} \dfrac{6x^3y}{2x^4+y^4}$

   (b) $\lim\limits_{(x,y)\to(2,-1)} \dfrac{y^3 \sin\dfrac{(x+1)\pi}{4}}{\sqrt{x^2-3y+2}}$

   (c) $\lim\limits_{(x,y)\to(3,1)} \dfrac{2x^2-10xy+12y^2}{5x^2-9xy-2y^2}$

   (d) $\lim\limits_{(x,y)\to(1,-1)} \dfrac{x^2-2xy+y^2-4}{x-y-2}$

   (e) $\lim\limits_{(x,y)\to(0,0)} \dfrac{xy+yz+zx}{x^2+y^2+z^2}$

2. (3 pts) Use the Squeeze Theorem to show that $\lim\limits_{(x,y)\to(0,0)} \dfrac{2xy\cos^2 y}{\sqrt{4x^2+y^2}}$ exists.

3. (1 pt each) Let $f(x,y,z) = \dfrac{3x^2+2yx-9y^2z^3}{3xy-7xyz+6yz^2}$. Find the following:

   (a) f_x

   (b) f_y

   (c) f_z

   (d) f_{yz}

   (e) $\dfrac{\partial^2 f}{\partial x \partial y}$

   (f) $\dfrac{\partial}{\partial x}\left(\dfrac{\partial f}{\partial z}\right)$

   (g) f_{zyx}