

Math 265
Spring 2007
Review Problems

1. Evaluate or show the limit doesn't exist:

$$(1) \lim_{(x,y) \rightarrow (1,1)} \frac{2xy}{x^2 + 2y^2} \qquad (2) \lim_{(x,y) \rightarrow (0,0)} \frac{2xy}{x^2 + 2y^2}$$

2. Find the domain of $f(x, y) = \sin^{-1} x + \tan^{-1} y$.
3. Show $f(x, t) = e^{x+ct}$ is a solution to the wave equation:

$$\frac{\partial^2 f}{\partial t^2} = c^2 \frac{\partial^2 f}{\partial x^2}$$

4. Find the directional derivative of $f(x, y) = xe^y$ at $(1, 0, 1)$ in the direction $\langle 3, 3 \rangle$
5. Find the tangent plane to the surface $xy^2z^3 = 12$ at $(3, 2, 1)$
6. If $z = x^2 \tan^{-1} y$ find dz
7. If $y^2 = x^3 + 17$ find $\frac{dy}{dx}$ at $(4, 9)$
8. Find and classify the critical points of $f(x, y) = (x^2 + y)e^{y/2}$
9. Find the global maximum and minimum of $f(x, y, z) = xyz$ subject to the constraint $2x^2 + y^2 + 4z^2 = 9$