Math 208, Summer 2007, Exam 2

Show your work. Justify your conclusions.

[6] **1**. Find the equation of the plane passing through the point $P = (1, 2 - 1)$ parallel to the plane $3x + y + 2z = 4$.

2. At time $t = 0$, a projectile is fired from the origin with speed 400 m/sec, at an angle of $\pi/3$ radians.

[5] **a**. Find the vector function $\vec{r}\,(t)$ that traces the projectile's path.

[2] **b**. Compute the impact time t^*.

[1] **c**. Write down *but do not evaluate* an integral for the arc length of the trajectory.

[4] **3**. Sketch the level curves of the function $f(x, y) = x^2 + \frac{y^2}{4}$.

[6] **4**. Show that $f(x, y) = (x^4 - y^2)/(x^4 + y^2)$ has no limit as $(x, y) \to (0, 0)$. (Hint: Try the two paths test.)

5. Compute the first partial derivatives of the given function.

[6] **a**. $g(u, v) = (uv + v^2 - 1)^4$.

[6] **b**. $f(t, \alpha) = \cos(2\pi t - \alpha)$.

[6] **6**. Compute the second-order partial derivatives of $u(x, y) = \sin(x^2 - y)$.

7. A function $z = z(x, y)$ is defined implicitly by the equation

$$z + e^{xz} + \ln(x + y) = y^2.$$

[6] **a**. Find $\partial z/\partial y$.

[2] **b**. Find $z_y(0, 1)$.