Team Homework 4

1. Find f_x and f_y if

   (a) $f(x, y) = \cos(x^2 y) + y^2$

   (b) $f(x, y) = \dfrac{xy}{x^2 + y}$

   (c) $f(x, y) = e^{x^2+y^2}$

   (d) $f(x, y) = xy \ln(xy)$

   (e) $f(x, y) = \sqrt{1 - x^2 - y^2}$

   (f) $f(x, y) = x \tan y$

   (g) $f(x, y) = \dfrac{1}{xy}$

2. Traffic in Tucson tends to be the worst at 8:30 AM and 5:15 PM each day, since this is when many residents commute to and from work. Let $C(d, t)$ be the expected time, in minutes, it will take a Tucson resident to drive a distance of d miles starting at time t hours after midnight on a given day.

   (a) Decide whether each of the following is positive, negative, or zero. Explain your answers.

   $$C_t(10, 8) \qquad\qquad C_t(10, 20)$$

   (b) Decide whether $C_d(10, 8)$ is less than, equal to, or greater than $C_d(10, 20)$. Explain your choice.

3. Find an equation for the plane tangent to $f(x, y) = x \ln(xy)$ at $(2, 1/2, 1)$.

4. Find all points on the surface $z = x^2 - 2xy^2 + 8x$ at which the tangent plane is horizontal.

5. A boundary stripe 3 in. wide is painted around a rectangle whose dimensions are 100 ft. by 200 ft. Use differentials to approximate the number of square feet in the stripe.