

**Quiz 4**

Name: \_\_\_\_\_

Thurs. 2/19/03

**1. Approximate  $e^{0.9} \cos(0.1)$ .**Let  $f(x, y) = e^x \cos y$ . Consider the point  $(1, 0)$ , and  $\Delta x = -0.1$ ,  $\Delta y = 0.1$ .Then,  $f(0.9, 0.1) \approx f(1, 0) + f_x(1, 0)\Delta x + f_y(1, 0)\Delta y$  $f(0.9, 0.1) \approx e + e(-0.1) + 0(0.1) = (0.9)e$ .**2. Find the equation of the tangent plane of  $f(x, y) = x \sin y + \cos x$  at  $x = 1$  and  $y = \pi$ .** $f_x(1, \pi)(x - 1) + f_y(1, \pi)(y - \pi) - (z - f(1, \pi)) = 0$  $(-\sin 1)(x - 1) - (y - \pi) - (z - \cos 1) = 0$ .**3. a. Find the directional derivative of  $f(x, y) = \frac{x}{\sqrt{y}} - y$  in the direction of  $u = \langle 1, 2 \rangle$  at the point  $P(-1, 4)$ .****b. Find the maximal decrease of  $f$  at the point  $P$ .**