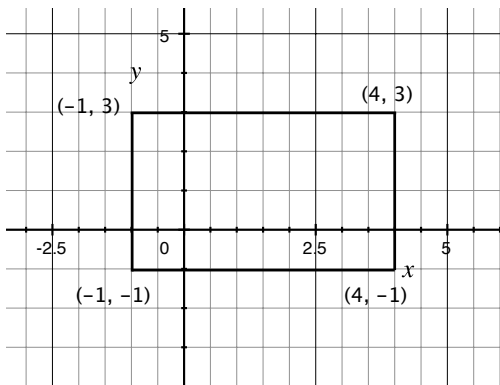


## Math 126 Worksheet

December 8, 2006

1. Let  $z = e^x \cos y$ , and let  $x$  and  $y$  be functions of  $s$  and  $t$  with  $x(1, 2) = y(1, 2) = 0$ ,  $\frac{\partial x}{\partial s} = 3$ ,  $\frac{\partial y}{\partial s} = 4$  at  $(s, t) = (1, 2)$ . Find  $\frac{\partial z}{\partial s}$  when  $(s, t) = (1, 2)$
2. The width of a rectangle is increasing at 2 inches/sec and the length is increasing at 5 inches/sec. How fast is the length of the diagonal changing when the width is 8 inches and the length is 15 inches long?
3. Suppose the depth of the ocean at  $(x, y)$  is  $h(x, y) = 3x^2 + 4y^2$  in miles. If a ship sails from the point  $(1, 2)$  toward the point  $(3, 0)$ , is the water getting deeper or shallower and at what rate? From the point  $(1, 2)$ , in which direction should the ship move to get to deeper water as quickly as possible?
4. Find the critical points of  $f(x, y) = 8x^3 - 24xy + y^3$  and classify them.
5. Let  $f(x, y) = e^{-x^2 - y^2 + 2x}$ . Find the absolute maximum and minimum values of  $f$  on the filled rectangular domain shown below.



6. Find the equation of the plane tangent to the sphere  $x^2 + y^2 + z^2 = 9$  at  $(2, 2, -1)$ .