

## DATA 605 - Discussion 15

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Section 12.3, Exercise 28, Page 679

### 28.

Form a function  $z = f(x, y)$  such that  $f_x = x + y$  and  $f_y = x + y$ .

### Solution

Firstly, since the second partials are equal to each other (0 in this case), by Schwarz's Theorem,  $f(x, y)$  exists.

If  $f_x = x + y$ , then  $f(x, y) = \frac{1}{2}x^2 + xy + c(y) + A$ .

If  $f_y = x + y$ , then  $f(x, y) = xy + \frac{1}{2}y^2 + d(x) + B$ .

Combining these, we get  $f(x, y) = \frac{1}{2}x^2 + xy + c(y) + A = xy + \frac{1}{2}y^2 + d(x) + B$ .

So our original function is  $z = f(x, y) = \frac{1}{2}x^2 + xy + \frac{1}{2}y^2$ .