Worksheets
10/5/2017

1. Compute the integral

$$\iint_D x(x+y)dA$$

where D is the rectangle defined by $-1 \leq x \leq 1$ and $0 \leq y \leq 1$.

2. Fill in the following table

Domain D	$\iint_D u(x,y)dA =$
$a \le x \le b$ and $c \le y \le d$	
$a \le x \le b$ and $f(x) \le y \le g(x)$	
$a \le y \le b$ and $f(y) \le x \le g(y)$	

3. For each of the domain D below, express it in form of one of the 3 types in the previous problem.

   (a) The rectangle with vertices (0,0), (2,0), (2,1), (0,1).

   (b) The triangle with vertices (0,0), (2,0), (2,1).

   (c) The triangle with vertices (0,0), (2,1), (2,-1).

   (d) The triangle with vertices (0,0), (1,2), (2,0).

4. Compute the integral

$$\iint_D x(x+y)dA$$

where D is the triangle with vertices (0,0), (2,0) and (2,1).

5. You have learned (or will learn) an important property of integration: Suppose the domain D can be "split" into two non-overlapping domains D_1 and D_2. Then

$$\iint_D u(x,y)dA = \iint_{D_1} u(x,y)dA + \iint_{D_2} u(x,y)dA.$$

An application is that: to find the integral of a function over a domain D which is not of any types in Problem 2, we try to split D into subdomains so that each belongs to one of the types in Problem 2. The integration on each subdomain can be computed. Then we add them together.

Let's practice! **Split the following domains into two (or more) subdomains, each of which is of one of the types in Problem 2.**

(a) D is the triangle with vertices (1,1), (2,3), (4,2).

(b) D is the quadrilateral with vertices (0,0), (1,1), (3,2), (4,0).