

MIDTERM2, ADVANCED MULTI-VARIABLE CALCULUS 425.1, SPRING
2018.

Name:

1 (20)	
2 (20)	
3 (20)	
4 (20)	
Tot.(80)	

Problem 1.

- (1) (10 pts) Find the linear orientation preserving mapping $T : \mathbb{R}^2 \rightarrow \mathbb{R}^2$ that send the parallelogram with vertices $(0, 0)$, $(2, 1)$, $(3, 2)$ $(5, 3)$ to the standard square with vertices $(0, 0)$, $(1, 0)$, $(0, 1)$, $(1, 1)$.
- (2) (10 pts) Compute the area of T (unit disc).

Problem 2. (20 pts) Change the order of integration in the integral:

$$\int_{-1}^1 \int_{-\sqrt{1-x^2}}^{\sqrt{1-x^2}} \int_{\sqrt{x^2+y^2}}^1 f dz dy dx$$

to the orders

$$\iiint f dy dz dx, \quad \iiint f dx dy dz.$$

Problem 3. (20 pts) Compute the integral

$$\iiint_V (x^2 + y^2) dx dy dz$$

where V is defined by $x^2 + y^2 \leq 2z, z \leq 2$.

Problem 4.(20 pts) Compute the average of $f(x, y, z) = x^2 + y^2 + z^2$ over the region $x^2 + y^2 + z^2 \leq x + y + z$.

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