

## Calculus(II)

**Homework 3, May, 28, 2020**

**Deadline: Jun, 10, 2020**

1. Use polar coordinates to find the limit. [If  $(r, \theta)$  are polar coordinates of the point  $(x, y)$  with  $r \geq 0$ , note that  $r \rightarrow 0^+$  as  $(x, y) \rightarrow (0, 0)$ .]

(a)  $\lim_{(x, y) \rightarrow (0, 0)} \frac{x^3 + y^3}{x^2 + y^2}.$

2. Find all the second partial derivatives.

(a)  $v = \frac{xy}{x-y}.$

3. Find the absolute maximum and minimum values of  $f$  on the set  $D$ .

(a)  $f(x, y) = xy^2, D = \{(x, y) | x \geq 0, y \geq 0, x^2 + y^2 \leq 3\}.$

4. Calculate the iterated integral.

(a)  $\int_1^4 \int_1^2 \left(\frac{x}{y} + \frac{y}{x}\right) dy dx$

5. Evaluate the double integral.

(a)  $\iint_D (x^2 + 2y) dA, D \text{ is bounded by } y = x, y = x^3, x \geq 0.$

6. Evaluate the iterated integral by converting to polar coordinates.

(a)  $\int_0^1 \int_y^{\sqrt{2-y^2}} (x + y) dx dy.$