MATH 2130 Problem Workshop 9

1. Find the maximum and minimum values of the function $f(x, y) = x^2 - y^2$ on the region $x^2 + y^2 \leq 1$.

2. Find the maximum value of the function $f(x, y) = xy(3 - x - 2y)$ on the triangle R bounded by the positive axes and the line $x + y = 1$.

3. Find the maximum value of the function $f(x, y) = x^2 - y^2 + 2x + \dfrac{9y}{2}$ on the region R bounded by $x = 1 - y^2, x = 0$.

4. Evaluate the double iterated integral

$$\int_{-2}^{0} \int_{0}^{-x} \sqrt{y - x} dy dx.$$

5. Evaluate the double integral of $f(x, y) = x^3y^3 - 3xy^2 + y$ over the region bounded by the curves $y = -x^2, y = x^2 - 1$.

Answers:

1. $1, -1$
2. $\dfrac{2\sqrt{3}}{9}$
3. $\dfrac{65}{16}$
4. $\dfrac{16(4 - \sqrt{2})}{15}$
5. $-\dfrac{\sqrt{2}}{3}$