

微分積分学 I 期末試験予想問題問 4 補足.

連立方程式を解くと以下のような答を得る.

$$\left[\lambda = \frac{\sqrt{5}}{\sqrt{2}}, x = \frac{\sqrt{2} \sqrt{2\sqrt{10}+7} + 2\sqrt{5} - \sqrt{2}}{6\sqrt{2}}, y = -\frac{\sqrt{2}\sqrt{10}+7 - \sqrt{10}+1}{6} \right] \quad (1)$$

$$\left[\lambda = \frac{\sqrt{5}}{\sqrt{2}}, x = -\frac{\sqrt{2} \sqrt{2\sqrt{10}+7} - 2\sqrt{5} + \sqrt{2}}{6\sqrt{2}}, y = \frac{\sqrt{2}\sqrt{10}+7 + \sqrt{10}-1}{6} \right] \quad (2)$$

$$\left[\lambda = -\frac{\sqrt{5}}{\sqrt{2}}, x = \frac{\sqrt{2} \sqrt{7-2\sqrt{10}} - 2\sqrt{5} - \sqrt{2}}{6\sqrt{2}}, y = -\frac{\sqrt{7-2\sqrt{10}} + \sqrt{10}+1}{6} \right] \quad (3)$$

$$\left[\lambda = -\frac{\sqrt{5}}{\sqrt{2}}, x = -\frac{\sqrt{2} \sqrt{7-2\sqrt{10}} + 2\sqrt{5} + \sqrt{2}}{6\sqrt{2}}, y = \frac{\sqrt{7-2\sqrt{10}} - \sqrt{10}-1}{6} \right] \quad (4)$$

$$\left[\lambda = \frac{3\sqrt{2}-2}{4}, x = \frac{1}{\sqrt{2}}, y = \frac{1}{\sqrt{2}} \right], \quad (5)$$

$$\left[\lambda = -\frac{3\sqrt{2}+2}{4}, x = -\frac{1}{\sqrt{2}}, y = -\frac{1}{\sqrt{2}} \right] \quad (6)$$

それぞれの場合を $f(x, y) = x^3 - xy + y^3$ に代入して, 計算すると,

$$(1),(2) \text{ の場合} \quad 1.134176911173474$$

$$(3),(4) \text{ の場合} \quad -1.208250985247548$$

$$(5) \text{ の場合} \quad 0.2071067811865475$$

$$(6) \text{ の場合} \quad -1.207106781186548$$

となり, 最大値は (1), (2) の場合, 最小値は (3), (4) の場合にとることがわかる.