King Saud University
Department of Mathematics

2 **Mid Term Exam** **205-Math** **Summer Semester (1439/1440)**

Question1 (3). Find the derivative of $f(x,y) = xe^y + \cos(xy)$ at the point $P(2,0)$ in the direction of the vector $v = 3i - 4j$.

Question2 (4)**.** Find the local extrema and saddle points of the function

$$f(x,y) = x^2 + y^2 + x^2 y + 4$$

Question3 (5)**.** (a) Find all the points on the circle $x^2 + y^2 = 1$ at which the function $f(x,y) = x^4 + y^4$ takes its maximum and minimum values.

(b) Calculate $\max f(x,y)$ *and* $\min f(x,y)$.

Question4 (4)**.** Evaluate the value of the integral $I = \int_0^2 \int_0^{4-x^2} \frac{xe^{2y}}{4-y} dydx$.

Question5 (4+1)**.** (a) Find the volume of the solid under the surface $f(x,y) = \frac{4}{1+\sqrt{x^2+y^2}}$ and over the closed region *R* in xy-plane bounded by the graphs $y = 0$, $y = -\sqrt{9-x^2}$

(b) Find the area of the region *R*.

Question6 (4)**.** Find the surface area of the surface $z = x^2 + y^2$ that lies between the planes

$$z = 0 \text{ and } z = 4$$