1. Find the local maximum and minimum values and saddle points of the function.

a) $f(x,y) = 3xy - x^2y - xy^2$

A. f attains its local maximum 1 at $(1,1)$. Saddle points are $(0,0)$, $(3,0)$, $(0,3)$.

b) $f(x,y) = (x^2+y)e^{y/2}$

A. f attains its local minimum $-\frac{2}{e}$ at $(0,-2)$.

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

a) $f(x,y) = 4xy^2 - x^2y^2 - xy^3$;

D is the closed triangular region in the xy-plane with vertices $(0,0)$, $(0,6)$, and $(6,0)$.

A. f attains its absolute maximum 4 at $(1,2)$ and minimum -64 at $(2,4)$.

b) $f(x,y) = e^{-x^2-y^2}(x^2+2y^2)$;

D is the disk $x^2+y^2 \leq 4$.

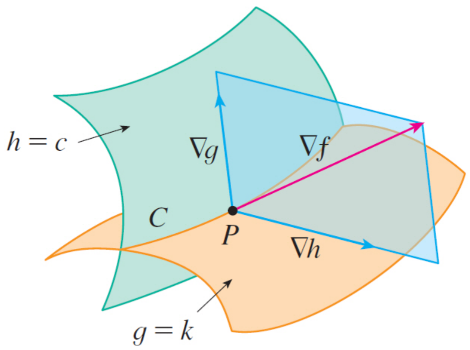
A. f attains its absolute maximum $\frac{2}{e}$ at $(0,1)$ and $(0,-1)$, and minimum 0 at $(0,0)$.

3. Use Lagrange multipliers to find the maximum and minimum values of f subject to the given constraint(s).

a) $f(x,y) = x^2y$; $x^2+y^2=1$

A. f has its maximum $\frac{2}{3\sqrt{3}}$ at $(\pm\frac{\sqrt{2}}{\sqrt{3}}, \frac{1}{\sqrt{3}})$ and minimum $-\frac{2}{3\sqrt{3}}$ at $(\pm\frac{\sqrt{2}}{\sqrt{3}}, -\frac{1}{\sqrt{3}})$.

b) $f(x, y, z) = x^2 + 2y^2 + 3z^2$; $x + y + z = 1$, $x - y + 2z = 2$



A. f has no maximum since f can attain sufficiently large values. f attains its minimum $\frac{33}{23}$ at $\frac{1}{23}(18, -6, 11)$.

4. Evaluate the double integral by first identifying it as a the volume of a solid.

$$\iint_R (5 - x)dA, \qquad R = \{(x, y) : 0 \leq x \leq 5, 0 \leq y \leq 3\}$$

A. $\frac{75}{2}$

5. Calculate the iterated integral.

a) $\int_0^1 \int_1^2 (4x^3 - 9x^2y^2)dydx$

A. -6

b) $\int_0^1 \int_1^2 \frac{xe^x}{y} dydx$

A. $\ln 2$

Course Homework due Mar 19, Wed.

Mar 10, Mon. : **15.3** 1, 3, 5, 7, 9, 11, 19, 21, 39, 41
Mar 12, Wed. : **15.4** 7, 9, 11, 13, 15, 17, 21, 23, 29
Mar 14, Fri. : **Midterm #1**