1. Find the extreme values of a function $z = f(x, y)$.

2. Find the extreme values of a function $x^2+y^2+6x+12$.

3. Find the maxima and minima of the function $x^3+3xy^2-15x^2-15y^2+72x$.

4. Find the dimensions of the rectangular box, open at the top of maximum capacity whose surface is 432sq.cm.

5. Explain the Lagrange's method of undetermined multipliers.

6. A rectangular box, open at the top, is to have a given capacity. Find the dimensions of the box requiring least material for its construction.

7. Find the minimum value of xy^2z^3 subject to $x + y + z = 24$.

8. Find the volume of the largest rectangular parallelepiped that can be inscribed in the ellipsoid $\dfrac{x^2}{a^2}+\dfrac{y^2}{b^2}+\dfrac{z^2}{c^2}=1$.

9. Find the minimum value of $x^2 + y^2 + z^2$ given that $ax + by + cz = p$.

10. Identify the saddle point and extreme points of $f(x, y) = x^4 - y^4 - 2x^2 + 2y^2$.