

p. 1002 (12.8)

Use Lagrange multipliers to find the closest point on the given curve to the indicated point.

5. $y = 3x - 4$, origin

9. $y = x^2$, $(3, 0)$

Use Lagrange multipliers to find the maximum and minimum of the function $f(x, y)$ subject to the constraint $g(x, y) = c$.

13. $f(x, y) = 4xy$ subject to $x^2 + y^2 = 8$

15. $f(x, y) = 4x^2y$ subject to $x^2 + y^2 = 4$

Find the maximum and minimum of the function $f(x, y)$ subject to the constraint $g(x, y) \leq c$.

21. $f(x, y) = 4xy$ subject to $x^2 + y^2 \leq 8$

23. $f(x, y) = 4x^2y$ subject to $x^2 + y^2 \leq 3$

27. Suppose that the business in example 8.4 (in book) has profit function

$P(x, y, z) = 3x + 6y + 6z$ and manufacturing constraint $2x^2 + y^2 + 4z^2 = 8800$. Maximize the profits.

31. Minimize $2x + 2y$ subject to the constraint $xy = c$ for some constant $c > 0$ and conclude that for a given area, the rectangle with smallest perimeter is the square.

32. As in exercise 31, find the rectangle box of a given volume that has the minimum surface area.

33. Maximize $y - x$ subject to the constraint $x^2 + y^2 = 1$.

34. Maximize e^{x+y} subject to the constraint $x^2 + y^2 = 2$.