

Name: \_\_\_\_\_

**§12.9 LAGRANGE MULTIPLIERS**

1. Use Lagrange multipliers to find the closest point on the curve  $y = x^2$  to the point  $(0, 2)$ .
2. Use Lagrange multipliers to find the maximum and minimum of the function  $f(x, y) = 4xy$  subject to the constraint  $4x^2 + y^2 = 8$ .
3. Find the maximum and minimum of the function  $f(x, y) = 4xy$  subject to the constraint  $4x^2 + y^2 \leq 8$ .

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4. Find the maximum and minimum of the function  $f(x, y) = 2x^3y$  subject to the constraint  $x^2 + y^2 \leq 4$ .

5. Maximize  $f(x, y) = e^{x+y}$  subject to the constraint  $x^2 + y^2 = 2$ .

6. Minimize  $f(x, y, z) = x^2 + y^2 + z^2$  subject to the constraints  $x + 2y + 3z = 6$  and  $y + z = 0$ .