

## MATH 1325

### Chapter 14.4: Lagrange Multipliers

JOSEPH LOUIS LAGRANGE (1736-1813)

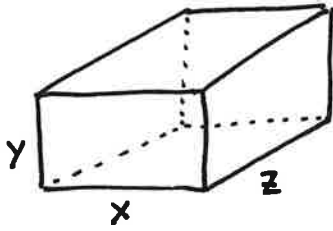
- FRENCH MATHEMATICIAN
- HE DEVELOPED A METHOD TO OPTIMIZE A FUNCTION OF TWO OR MORE VARIABLES SUBJECT TO A CONSTRAINT
- "OPTIMIZE  $f(x,y)$  WITH  $g(x,y) = 0$ "

FIND THE MINIMUM VALUE OF  $f(x,y) = x^2 + y^2$  WITH  $x + y - 4 = 0$ .

FIND THE MINIMUM VALUE OF  $f(x,y) = x^2 + y^2$  WITH  $x + y = 4$ .

THE COST OF A 3-STORY BUILDING WITH A RECTANGULAR FLOOR PLAN IS  $C(x,y) = xy + 30x + 20y + 474000$  WHERE  $x$  IS THE LENGTH AND  $y$  IS THE WIDTH OF EACH RECTANGULAR FLOOR. FIND  $x$  AND  $y$  TO MAXIMIZE EACH FLOOR'S AREA AT A COST OF \$500000.

FIND  $x$ ,  $y$ , AND  $z$ , 3 POSITIVE NUMBERS, SUCH THAT  $x+y+z=50$   
AND  $xyz^2$  IS AT ITS MAXIMUM.



THE SURFACE AREA OF THIS CLOSED BOX IS  $6 \text{ ft}^2$ .  
FIND ITS MAXIMUM VOLUME.