

13.9: Applications of Extrema

Example 1: Find three positive numbers x , y , and z such that the sum is 32 and $P = xy^2z$ is at a maximum.

Example 2: Melika Candle Company manufactures candles at two locations. At Location A, the cost of producing x units is $C_A = 0.02x^2 + 4x + 500$. At Location B, the cost of producing x units is $C_B = 0.05x^2 + 4x + 275$. The candles sell for \$15 per unit. Find the quantity that should be produced at each location to maximize profit.

Example 3: Find the distance from the point $(1, 0, -2)$ to the plane $x + 2y + z = 4$.

Example 4: A rectangular box without a lid is to be made from 12 square meters of cardboard. Find the maximum volume of such a box.

Example 5: The base of an aquarium with given volume V is made of slate and the sides are made of glass. If slate costs five times as much (per unit area) as glass, find the dimensions of the aquarium that minimize the cost of the materials.