

1. Find the point on the line $y = \frac{2}{3}x + 4$ that is closest to point $(-4,7)$.
2. Find the dimensions of a rectangle with the largest area that is bounded at its base by the x-axis with the other two vertices lying above the x-axis and lying on the parabola $y = -x^2 + 4$.
3. A box with a square base and an open top must have a volume of $1,600 \text{ cm}^3$. Find the dimension of the box that minimizes the amount of the material used.
4. If $1,600 \text{ cm}^2$ of cardboard is used to make a box with a square base and an open top, find the largest possible volume of the box.