

1. Find the maximum and minimum values of

$$f(x) = -x^3 + 5x^2$$

on the interval  $-2 \leq x \leq 4$ .

2. A rectangle has its base on the  $x$ -axis and its upper two vertices on the parabola  $y = 12 - x^2$ . What is the largest area the rectangle can have?
3. Find the point(s) on the parabola  $y = x^2 - 3$  that is closest to the origin.

(Hint: Rather than minimizing the distance to the origin, you can minimize the *square* of the distance. This will make the algebra easier.)