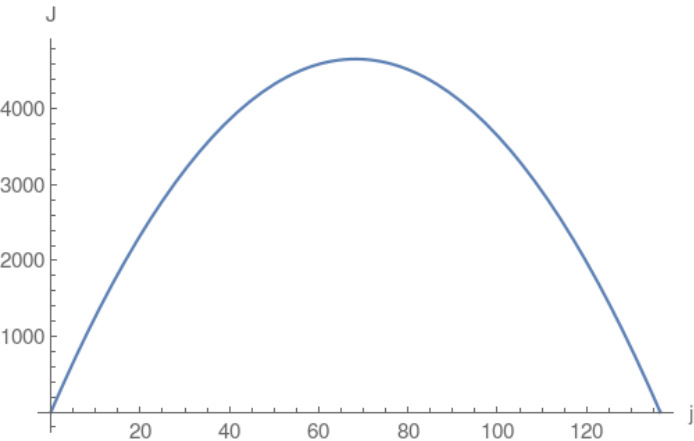
2.

2. Perimeter of rectangle $= 2(j+a) = 273$ where a is the length of the other edge of rectangle. Area of the rectangle is $= j \times a$.
Use perimeter equation
and solve for $a = \frac{273-2j}{2}$

Then reformulate the area $J = j \times a = \frac{273\,j}{2} - j^2$ which turns out to be a quadratic Parabola:



Compute the vertex $\frac{273}{4}$ and then plug the vertex into the area which will compute the maximum area.