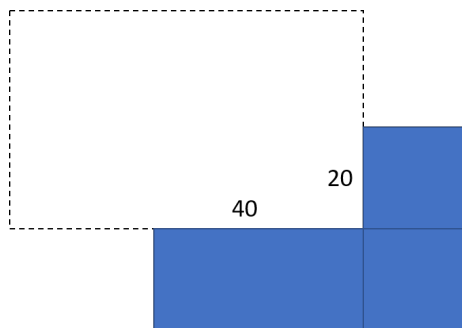Your friend is working on the following homework problem:

Suppose that Farmer Brown decides to use 80 feet of fence to make a rectangular pen to fit a 20-foot by 40-foot corner, as shown below (all of the corner must be used and does not require fence). What dimensions give the pen a maximum area?

20

40

Here is your friend's work:

The area of the pen is $A = xy$.

The total amount of fencing used is $x + y + (x - 20) + (y - 40) = 2x + 2y - 60$.

Because he is using 80 feet of fence, we see that we must have $2x + 2y - 60 = 80$.

Solving for y in terms of x gives $y = x - 70$.

Thus, we are being asked to maximize $A(x) = x(x - 70) = x^2 - 70x$.

This is maximized when $A'(x) = 0$, so we calculate $A'(x) = 2x - 70$.

Solving $2x - 70 = 0$ gives $x = 35$, so our function is maximized at $x = 35$.

Then $y = 70 - x = 35$.

So, then pen should be 35 feet by 35 feet.

Is your friend's work correct? If not, identify the error(s) and provide a correct solution.