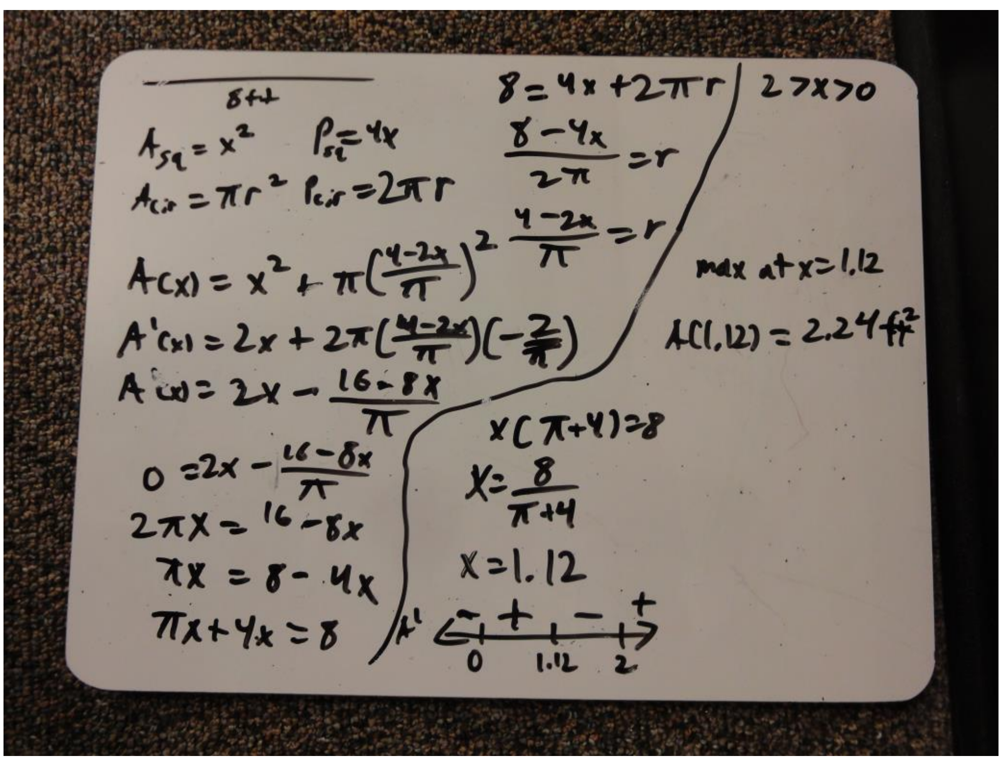
More on optimization (Level II Problem):

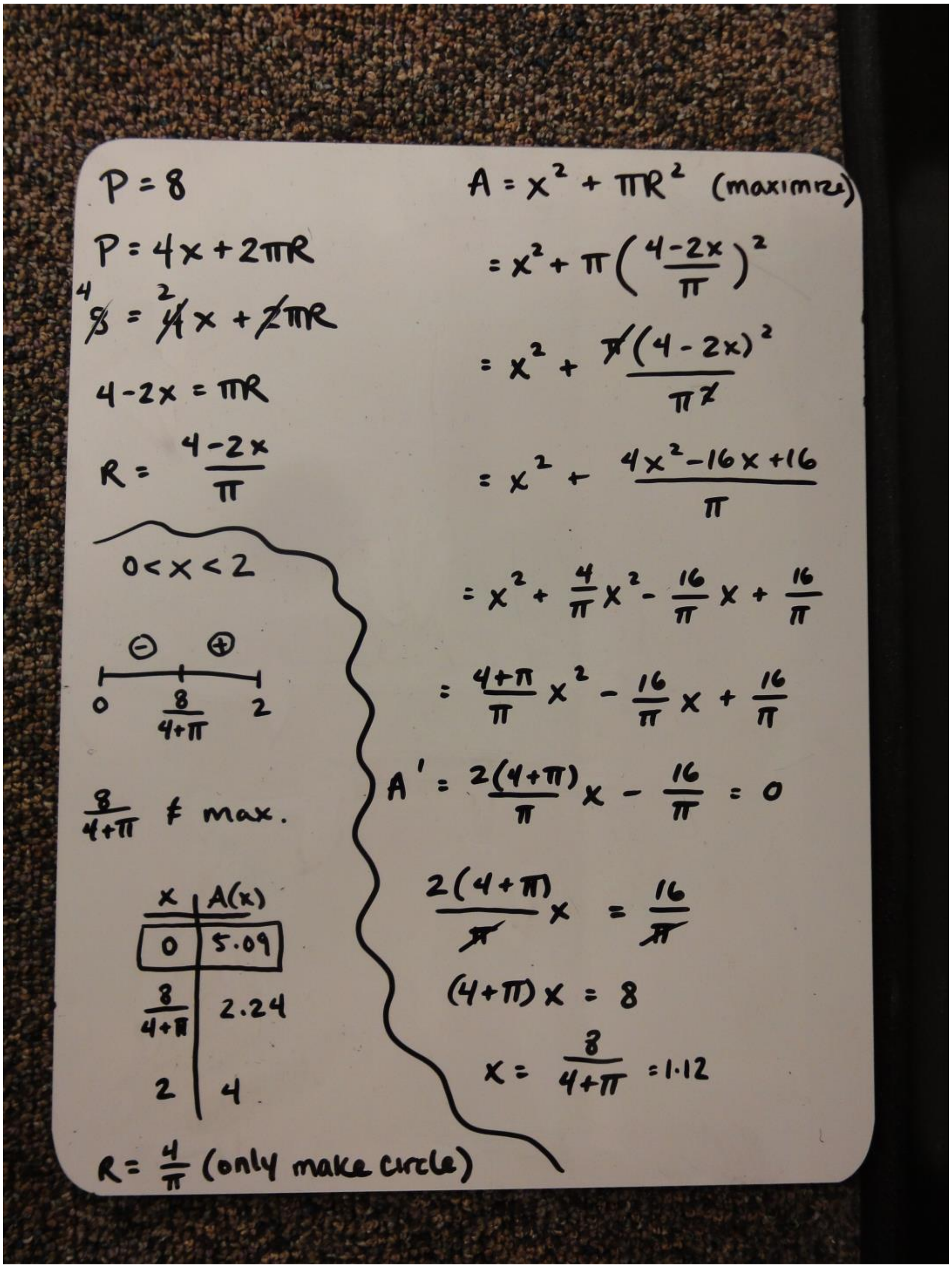
Eight feet of wire is to be used to form a square and a circle. How much of the wire should be used for each figure to enclose the maximum area?

For discussion purposes, use x to denote the side of the square and r for the radius of the circle. Show that the area, as a function of x, is given by $A(x) = x^2 + \pi\left(\frac{4-2x}{\pi}\right)^2$.

The mathematics on this board (below) is valid but the conclusion is not. It turns out that $x \approx 1.12$ corresponds to a minimum, not a maximum (but the critical number identified is correct).



Here is a great solution:



The chart in the lower left of the board shows that the maximum area occurs ($5.09\ \text{ft}^2$) when $x = 0$. In other words, <u>**don't use any wire to make the square**</u>; just make the circle. This makes sense if you think about it….circles enclose large areas without using a lot of material to enclose the circle (i.e., circles have no corners).