Question

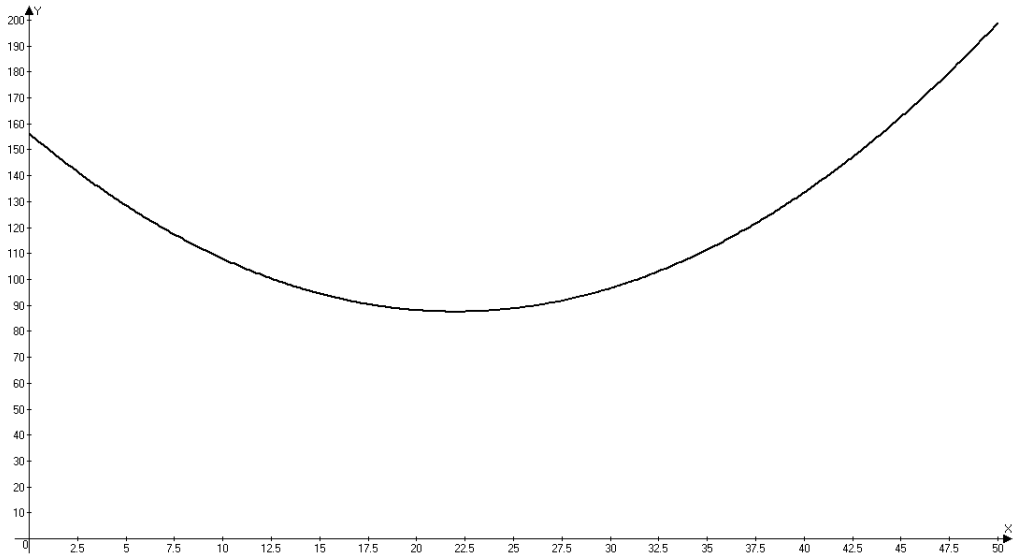
Square: $S_1 = \left(\frac{50-x}{4}\right)^2$. Circle: $x = 2\pi r \Rightarrow r = \frac{x}{2\pi} \Rightarrow S_2 = \pi \cdot \left(\frac{x}{2\pi}\right)^2 = \frac{x^2}{4\pi}$. Total area:

$S = S_1 + S_2 = \left(\frac{50-x}{4}\right)^2 + \frac{x^2}{4\pi}$. We will find minimum area:

$$S' = -\frac{1}{4} \cdot 2 \cdot \left(\frac{50-x}{4}\right) + \frac{2x}{4\pi} = 0 \Rightarrow 8\frac{x(\pi+4) - 50\pi}{4\pi} = 0 \Rightarrow x = \frac{50\pi}{\pi+4}.$$

For square: $l = 50 - x \Rightarrow l = 50 - \frac{50\pi}{\pi+4} = \frac{50\pi + 200 - 50\pi}{\pi+4} = \frac{200}{\pi+4}$.

And we will graph this function:



As we see the maximum area is when x = 50. So, the length of the square wire is 0.

a) The length of wire for square is 0.

b) The length of wire for square is $\frac{200}{\pi+4}$.