PROBLEM:

Suppose that $x(t)$ is formed via the following sum:

$$x(t) = 10\sqrt{3}\cos(77\pi t + \pi/6) + A\cos(77\pi t + \phi) \tag{1}$$

where A is a *positive* number. In addition, assume that $x(t)$ has a phase of zero, so it is also given by the sinusoidal definition:

$$x(t) = B\cos(77\pi t), \tag{2}$$

where B is a *positive* number.

(a) In this part assume that $B = 20$, and solve for A and ϕ.

(b) Now assume that B can vary. Solve for A, B and ϕ so that the value of A is *minimized* among all possible choices that satisfy equations (1) and (2). Draw a plot of the complex amplitudes to prove (via a geometrical argument) that you have found the minimum for A. (Remember that $A > 0$)
Hint: To solve this problem try a graphical approach with plots of the complex amplitudes. Also, recall the geometrical theorem that tells you how to find the shortest distance between a line and a point not on the line.