if $\varsigma_i \gg 1$

$$\underbrace{\alpha_1^2 + \alpha_2^2}_{> 0} > \underbrace{\alpha_1 \alpha_2}_{< 0} \underbrace{(\varsigma_i - 1)}_{> 0} \quad \square \tag{67}$$

for $\varsigma_i \geq 0$ (always)

$$\underbrace{\alpha_1^2 + \alpha_2^2}_{> 0} + \underbrace{e^{-\varsigma_i}}_{\geq 1} \underbrace{\left(\frac{2}{\sigma^2} + 1\right)}_{> 0} > \underbrace{\alpha_1 \alpha_2}_{< 0} \underbrace{(\varsigma_i - 1)}_{> 0} \quad \square \tag{68}$$

4. [5 points] Why does this prove that we are GUARANTEED to have within $\epsilon > 0$ of the right answer?

   - Because the Hessian Matrix of the function is positive-semidefinite, the given function is convex. On top of which, since we are maximizing the function, we are required to step with the gradient and stop when the slope is less than some tolerance (ϵ). The gradient gives the slope/direction of the greatest change and we "walk" in teh direction which makes the gradient zero. We are guarenteed that one exists since the Hessian is positive-semidefinite.