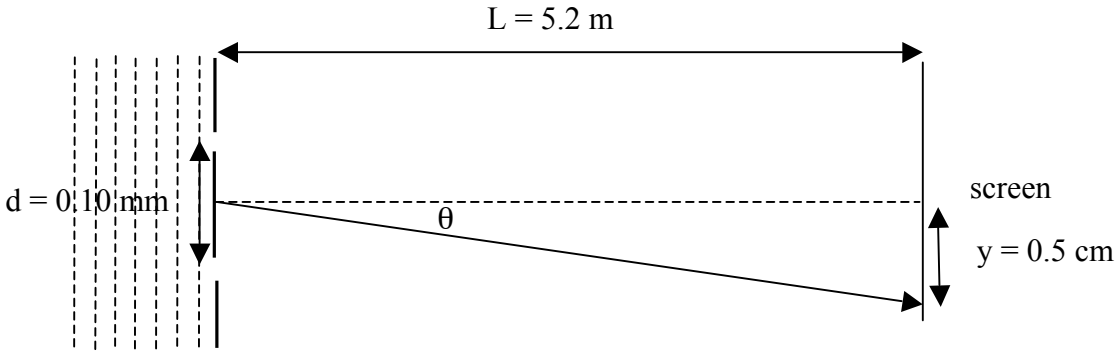
Physics 214 **Quiz 1-1 [20 points]** **Week 2**

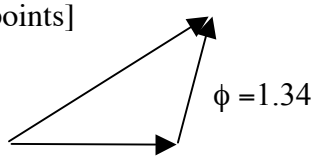
Consider the interference pattern from two identical slits equally illuminated by coherent light of a wavelength $\lambda = 450$ nm and separated by a distance $d = 0.10$ mm. A screen is placed at a distance $L = 5.2$ m away from the slits. We are interested in the intensity of the light at position y = 0.5 cm on the screen.



a) [3 points] Calculate the angle θ. Are you justified to use the small angle approximation?
   - [2 points] θ =y/L= 0.00096
   - [1 points] yes! y << L

b) [5 points] Calculate the phase shift between the two sources arriving at the same point y on the screen. What approximation are you using?
   - [4 points] ϕ = 2Pi(θd)/λ =1.34 (check formula/logic and units for the working)
   - [1 points] d << L (and or they could answer θ small)

c) [7 points] Draw a schematic phasor diagram for the addition of the waves. What is the ratio of the intensity at point y to the intensity at the center of the screen?
   - [4 points]



   - [3 points] cos^2(ϕ/2) = 0.61 (formula/logic)

d) [5 points] If the distance between slits d is doubled what happens to the phase shift? What happens to the interference pattern? (The pattern stretches/shrinks by a factor of _____.)
   - [2 points] it doubles -> 2.68
   - [3 points] The pattern shrinks by a factor of 2