1. You are viewing a soap film held in a circular vertical frame. You are looking straight on (perpendicular) to the soap film and the film is illuminated by a small white light almost directly behind your head. Starting at the top, you see a dark band, a blue band, a red band, another blue band, another red band, a third blue band and a third red band at the bottom. Things to remember: \( n_{\text{water}} = 1.33, \lambda_{\text{blue}} = 400\text{nm}, \lambda_{\text{red}} = 700\text{nm}. \)

(a) What is the thickness of the soap film at the bottom? (3 points)

(b) Your friend views the film from the other side and sees it via transmitted light rather than reflected light. Your friend also sees horizontal bands. Describe the bands your friend sees. Hint: the film does not absorb any light. (2 points)

Rewrite and sign the Honor Pledge: *I pledge my honor that I have not violated the Honor Code during this examination.*

Signature

(OVER)
2. In a Young’s double slit set-up (shown schematically to the right), coherent light of wavelength $\lambda$ travels from the left and strikes a mask containing two very small slits separated by distance $d$. The light passing through the slits forms an interference pattern on a screen a distance $L$ to the right. The distance between adjacent maxima in the pattern is $y$.

(a) Suppose, $\lambda = 500\text{nm}$, $d = 0.2\text{mm}$, and $L = 8\text{m}$. What is $y$? (2 points)

(b) To increase the fringe spacing, $y$, can one **INCREASE** or **DECREASE** the distance to the screen, $L$? (circle one). (1 point)

(c) To increase the fringe spacing, $y$, can one **INCREASE** or **DECREASE** the wavelength, $\lambda$? (circle one). (1 point)

(d) To increase the fringe spacing, $y$, can one **INCREASE** or **DECREASE** the slit separation, $d$? (circle one). (1 point)