

Spring

Physics 133: Midterm II  
Professor Frank De Lucia

2:30 Section

Name (1 pt): \_\_\_\_\_

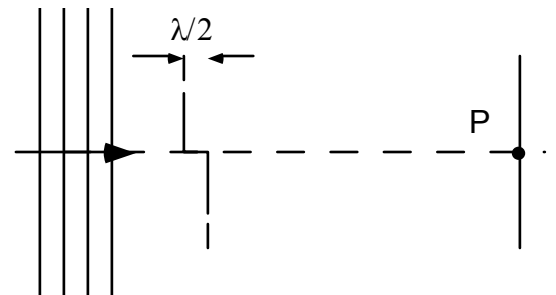
Recitation Instructor (1 pt): \_\_\_\_\_

There are four pages to this midterm (plus an equation sheet). It is important that you write your name on each page and the name of your recitation instructor on the first page. Each name is worth one point.

Be sure to include the proper units in your answers.

Problem I.1 (10 pts): A double-slit experiment produces interference fringes for light of  $\lambda = 600$  nm that are 1 cm apart on a wall located 10 m from the slits. How far apart are the slits?

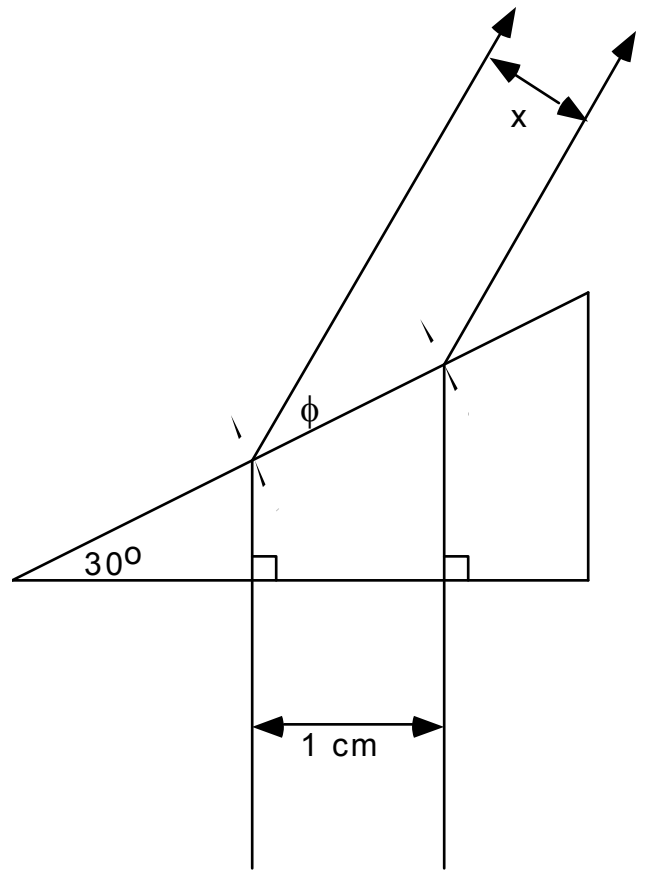
Problem I.2 (10 pts): A double slit experiment is modified as shown in the figure so that one of the slits is  $\lambda/2$  farther to the right than the other. Plane waves of light are incident from the left as shown in the figure. At "P", the central location on the screen, is there a maximum or a minimum? Why?



Name (1 pt): \_\_\_\_\_

Problem II.1 (25 pts): Two light rays, separated by 1 cm, are incident on the bottom of a  $30^\circ - 60^\circ - 90^\circ$  prism, as shown in the figure. The index of refraction of the prism is  $n = 1.5$ . When the light exits the prism, the two rays are separated by a perpendicular distance "x".

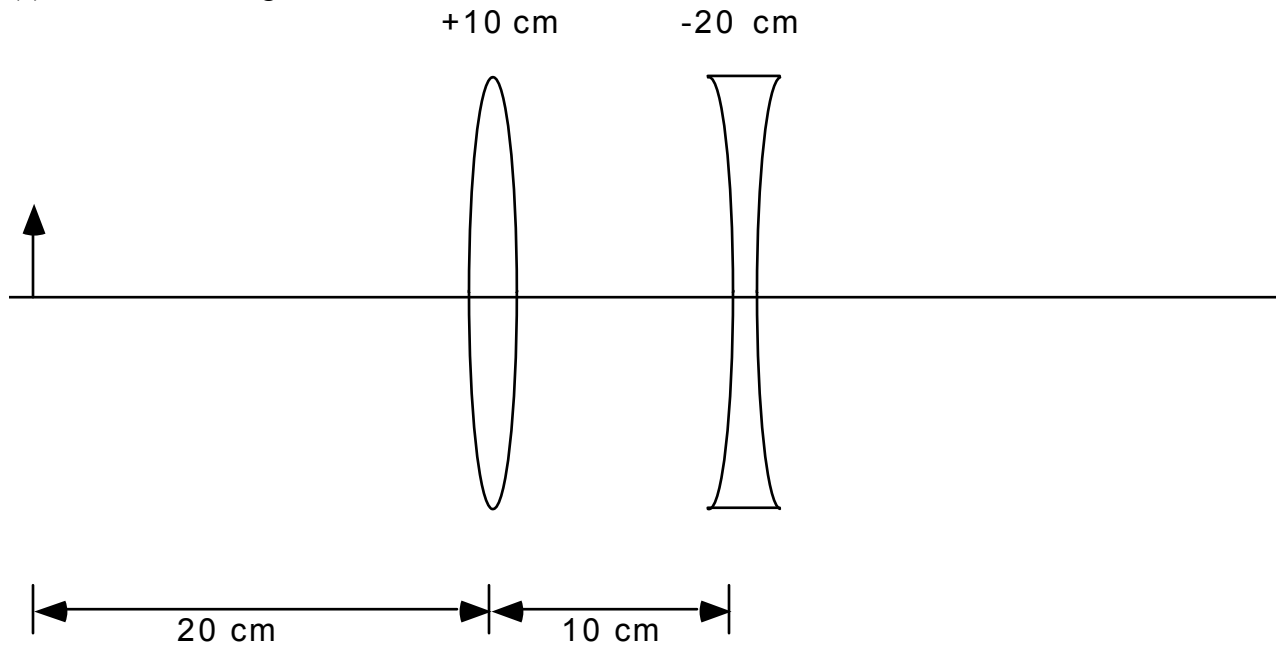
- (a) What is the angle  $\phi$  between the light as it exits the prism and the inclined face of the prism?
- (b) Find the distance "x".



Name (1 pt): \_\_\_\_\_

Problem II.2 (25 pts): Consider the object and two lenses shown in the figure.

- (a) What is the location of the final image?
- (b) What is the overall magnification of the system?
- (c) Is the final image real or virtual?



Name (1 pt): \_\_\_\_\_

Problem II.3 (25 pts): A broad beam of light of wavelength 600 nm is sent directly downward through the top plate of a pair of glass plates. The plates touch at the left end and are separated by  $1.8 \mu\text{m}$  at the right end. How many bright fringes will be seen by an observer looking down through the top plate?

