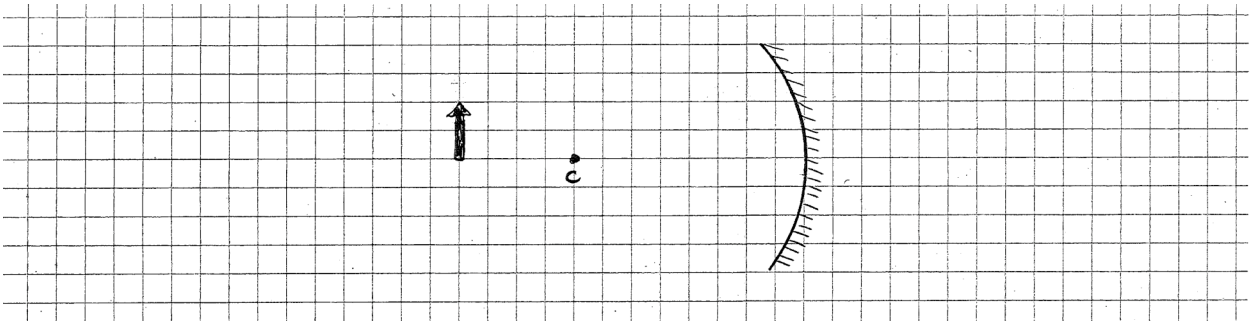
Physics 262. Exam 2. Geometric Optics & Interference

1&2] Use ray tracing (or any other correct method) to find the image of the arrow in the concave mirror. Each square is 1 cm on a side. The center of curvature is shown. How far is the image from the mirror plane (in cm)?

3] The image is to the (a) left or (b) right of the mirror? Or (c) at infinity.

4] The image is (a) real or (b) virtual or (c) at infinity?

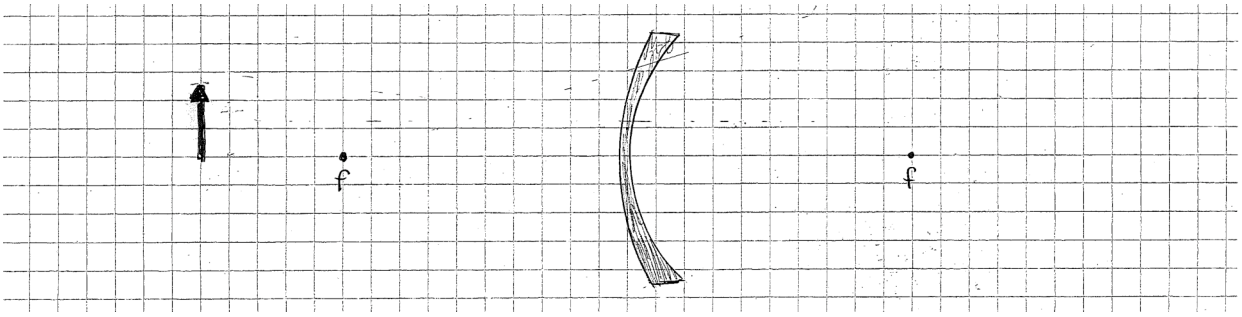
5&6] What is the magnitude of the magnification, in %?



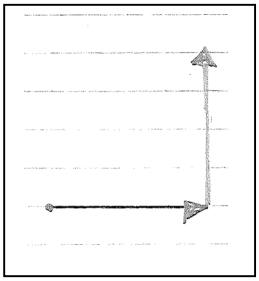
7&8] Use ray tracing (or any correct method) to find the image of the arrow in the lens shown. The lens thinner in the middle than at the edges. The focal points of the lens are shown. How far is the image from the lens plane?

9] The image is to the (a) left or (b) right of the lens? Or (c) at infinity.

10] The image is (a) real or (b) virtual or (c) at infinity?



11&12] A phasor diagram for one angle (in the far field) for a two-slit interference pattern. It shows the *relative* phase of the wavelets from each slit. If the slit separation is 4 microns and the wavelength is 0.5 microns, what is the smallest angle (in degrees) for which the phasor diagram is correct?



13&14] If the intensity of the light at the center of the interference pattern is 80 W/cm^2, what is the intensity at the angle you found in 11&12 (in W/cm^2)?

15&16] Suppose a third slit (of the same width) is added 8 microns above the other two. What is the intensity of the interference pattern straight ahead now (W/cm^2)?

17&18] What is the intensity of the 3-slit pattern at the angle you found in 13&14 (W/cm^2)?

19&20] If, instead, the phasor diagram represents the light reflected from a thin soapy water film (in air), what is the thinnest the film could be? Give your answer in *nanometers*.