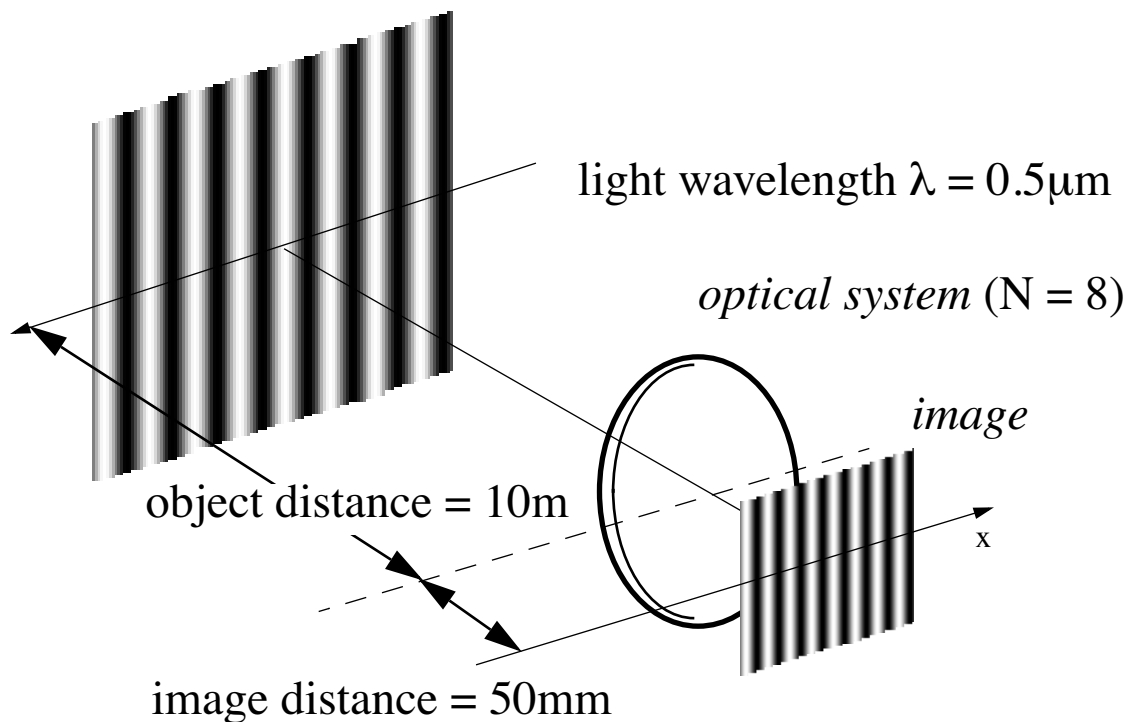


Homework 2

Due **in-class, February 6, 2003**

1. A 2-D target is imaged by a camera, with the following specifications:

$$\text{object} = 100 + 100\cos(2\pi x/P), P = 2\text{mm}$$



The optical system is diffraction-limited with a circular aperture.

Assuming the lens is a linear system in light intensity, find the modulation of the image (assume infinite extent for both the object and image). (50%)

2. Suppose the image in problem 1 is scanned in the  $x$ -direction with a square detector, width =  $7\mu\text{m}$ . What is the modulation of the output signal? Assume continuous, instantaneous scanning, with no sampling or electronic filtering of the signal. (30%)

3. What is the maximum detector size for scanning in problem 2 that would preserve at least 80% of the input image modulation? (20%)