1. Consider a binary star whose components are separated by 9.7 arcseconds.

   (a) For which SFSU telescope will the two stars appear farthest apart on the focal plane? Explain.

   (b) With this telescope, how far apart in the focal plane will the two stars be, in mm?

2. Suppose you have the following choice of eyepieces:

   40 mm, 32 mm, 25 mm, 15 mm

   (a) To get the maximum possible magnification, which SFSU telescope and which eyepiece would you choose, and what magnification would you get?

   (b) To get the widest possible field of view, which telescope and which eyepiece would you choose?
3. Suppose you have the following set of lenses and mirrors from which to build a telescope:

   lenses: 3 inch diameter, 30 inch focal length  
   10 cm diameter, 40 cm focal length  
   1 cm diameter, 5 cm focal length  
   0.5 cm diameter, 1.5 cm focal length  

   mirrors: 20 cm diameter, 50 cm focal length

(i) Which lens or mirror, if used as the objective lens or primary mirror, would make the largest image in the focal plane?

(ii) Which lens or mirror would make the brightest image in the focal plane?

(iii) Which combination of lenses and/or mirrors would provide the greatest magnification? How much magnification would you get?

4. Look up the specifications of the primary mirror of the Hubble Space Telescope (HST).

   (i) What is the diameter of HST’s primary mirror?

   (ii) What is the focal length of HST’s primary mirror?

   (iii) What is your source(s) for the above information?

   (iv) Consider two stars that are 1 arcsecond apart in the sky. How far apart will they appear on the focal plane in HST? Express your answer in a metric unit that makes the value greater than one.

   (v) The pixels on the newest camera on HST, known as WFC3 (3rd-generation wide-field camera) are squares that are 15 microns on a side. If this camera is used to make an image of the two stars in part (iv), how far apart will they be in pixels?