Homework #3 Geology 4113 (Remote Sensing) Assigned Feb. 9, 2018 Due February 17, 2018

**Sabins #3.06 (10 points)** That is, Sabins **Chapter 3 Problem #6** (at the end of the chapter). The oscillating mirror of the TM completes 14 scans each second. Calculate the dwell time for each ground resolution cell.

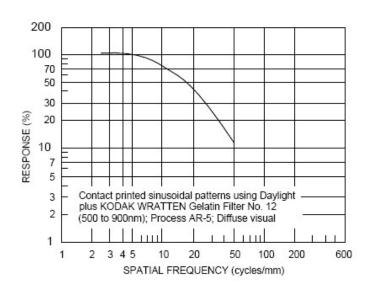
**Sabins #3.08:** (15 points) The northern portion of the TM mosaic of the Central Arabian Arch (Plate 4) covers parts of two major sand seas, shown by bright orange-yellow signatures. There are two distinctly different patterns of sand dunes. Describe each of the dune patterns, including the shape, alignment, and size (of individual dunes). (*RRH note: This will require a short paragraph. You should be as specific as possible in describing terms such as size and shape. Give sizes in km, list azimuths (if relevant) in degrees E of N.) Although you don't need to read it to answer this question, in case you are interested there is a more detailed discussion of the geology of the region on pages 346 - 357. We will cover that later in the semester)* 

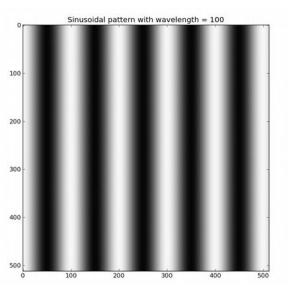
1) (Modulation Transfer Function (MTF) 15 points) The following is the MTF which Kodak publishes in their film information sheet for AEROCHROME III Infrared Film 1443, used for aerial photograph. Rather than being calibrated in cycles/radian, because this applies to film, it is calibrated in cycles per millimeter. It shows how higher and higher frequency (smaller and smaller spacing) light-and-dark sine waves patterns will blur out when recorded on that film.

a) Find the frequency (given in cycles per millimeter) at which the response drops to 50%.

b) Assume this film is used with a "perfect" camera lens which has a focal length of 0.25meter. What spatial frequency given in cycles per radian, corresponds to that 50% point?

c) Assume the camera is being used from an aircraft flying at 5,000 meters. What distance on the ground corresponds to this spatial wavelength? That is, suppose you wanted to draw a light-and-dark sine-wave pattern on the ground which would be "blurred" just enough to reduce its apparent contrast by 50% How big would that sine-wave pattern be as measured by its wavelength – the distance between one bright band and the next bright band? (Note. We're talking about wavelengths of the light and dark pattern, not wavelengths or frequencies of the light itself.)





## Modulation Transfer Function