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.)