Homework 1. **Radiometric Camera Design**, assigned Thu, 29-Jan due Thu, 12-Feb

Design camera with the following requirements:

- 0.1 meter GSD – ground sample distance (pixel size on the ground)
- Panchromatic (400-700 nm) sensitivity, pushbroom linear array
- Operate in low earth orbit, LEO, 400km – 2000km altitude
- Use Kodak KLI4104 x3 in a staggered arrangement to obtain 22,000 samples in the virtual "line", obtain 22,000 lines in a scene. The scene must be acquired in 8 seconds max.
- Assume that we can obtain a special version of this sensor with 28 TDI (time delay and integration) stages. This allows us to effectively multiply the exposure time by any any integer factor up to 28, as needed.
- Camera will be nominally nadir-looking
- Acquire a scene by slewing, or rotating the camera at the necessary angular velocity (i.e. it will be panoramic geometry but very narrow field of view)
- Get sensor specs from www.kodak.com
    - Saturation signal (for the "luma" channel) (full well capacity)
    - Quantum efficiency
    - Max line rate (called "tint")
    - Assume integration time, available for exposure, is max 80% of "tint"
- Max aperture radius is 1 meter.

Give your recommendations for the following

- Aperture size
- Altitude
- Focal length
- Line rate
- Angle slew rate for forward scan
- Angle slew rate for backward scan

Use constants from the IRIS example for noise loss factor (K=0.7), max albedo (0.7), and atmospheric attenuation (0.64). Confirm that the geometric resolution is consistent with the diffraction limited resolution. Show you work and intermediate results so I can see how you arrived at your solution.

If for any reason you cannot solve the problem with the given constraints, then explain how you would recommend modifying the constraints and give a solution under those circumstances

Note: use the IRIS example for approach to radiometry. See last year’s homework 1 for a similar problem and solution.