Homework 1
Should be submitted to the course Moodle site by 5pm on Monday, January 30

1. Find a popular science article about an astronomy discovery within the past 5 years that you find interesting, then find the published science paper that corresponds to it (the website arxiv.org has "public access" versions of nearly every published astronomy article if you have trouble getting the original). Compare (a) the text of the science paper abstract to the text of the news article and (b) the figures in the paper to those in the news article, and then answer the following questions in 1-2 paragraphs each. Don't get bogged down in any jargon in the science paper – take a "10,000 foot view" and focus on the big picture.
   a. Why was this discovery important and newsworthy? Is its significance described differently in the two articles?
   b. Copy and paste an image from the news article and a figure from the science paper and place them side by side. Try to pick ones that you think are designed to make the same point in both articles. Describe the similarities and differences between the two.
   c. How is the evidence in support of the main conclusion presented differently between the two articles? You should use *specific examples/quotations* to support your argument.
   d. Do you think the popular science article faithfully represents the significance and nature of the discovery, as well as any uncertainty in the conclusions? Why or why not?

2. One type of calculation that we will use often in this class is an "Order of Magnitude" estimate. Scientists use these kinds of calculations frequently to get a sense for the scale of a problem, the reasonableness of an answer, etc. Use the following facts about the soon to be commissioned Large Synoptic Survey Telescope (LSST) to answer the questions that follow.
   *LSST will take **two** 15sec images per "visit" to an area of the sky*
   The camera takes 2sec to "read out" (record) each image
   The telescope takes only 5sec to move to the next "field"
   *LSST Camera = 3,200 **Mega**pixels*
   1 LSST pixel = 2 Bytes
   a. Estimate the amount of data (in Bytes) that LSST will collect in one night of observing. You will have to make some assumptions about the length of a night, etc. Any time you make an assumption, justify it in words.
   b. The average size of the hard drive on a modern laptop is 1TB. How many of these will be filled up over the course of 1 year of the LSST mission?

3. Modify the plotttrig module that you defined in Lab 2 to meet the following criteria. Submit this part of the homework as a separate file named *yourname*_plottrig.py.

      a. Modify the plottrig module from the lab so that users can enter a "phase shift" (shift the function in the x-direction by some amount) as an optional argument

      b. Allow the users to specify an amplitude for the function as an optional argument.

      c. Allow users to modify the range (minimum and maximum x value of the plot) plotted as an optional argument. Right now all our functions go from 0 to 2 pi, but we should let the user alter those numbers.

If working properly, loading the module in a Jupyter notebook and typing pt.makeplot('sin', wavelength = pi, range = [0,3*pi], amplitude = 3, shift=pi/4) should generate a figure with a sin wave of amplitude 3 that repeats three times over the range 0 to 3*pi and has a y value of 3 at x=0.