CSE 231 Fall 2011

Programming Project #08

Assignment Overview
This assignment will give you more experience with dictionaries, functions and lists. In particular it will utilize default arguments to functions. It is due Nov 14th (exam on Nov 10th) and worth 50 points (5% of the overall grade).

The Problem
Sunspots, storms that occur on the sun, are a cyclic process. These geomagnetic storms can adversely effect electric power grids, disrupt terrestrial electronic telecommunications and cause disorientation or failure of communications satellites. There are a number of agencies that record the sunspot activity, for example the national oceanic and atmospheric agency. You will write some code that manipulates this data. Take a look at:

ftp://ftp.ngdc.noaa.gov/STP/SOLAR_DATA/SUNSPOT_NUMBERS/INTERNATIONAL/monthly/MONTHLY

Program Specifications:
You will write the following *two* functions:

1. **init_dictionary(file_string, sunspot_dict)**. This function takes as an argument the name of file to open and an empty dictionary. It has no return value but does fill the dictionary with values. The key should be the year; the data should be a list of sunspot data for the months of that year.
2. **avg_sunspot(sunspot_dict, year_tuple, month_tuple)**: This function takes in the initialized sunspot dictionary and two tuples. Each tuple is in the form (start, end) where start and end are inclusive. The first is a year tuple (with a potential range from 1749 to 2011 inclusive) and the second is a month tuple (with a potential range from 1 to 12 inclusive). It will return an average sunspot value for the given ranges. If no value is given for either tuple, the default is the full range.
3. You must provide **error checking** for all of these functions! The ranges must be correct or an error is indicated. The file must be available or an error. Think about what errors should be checked. If an error occurs, it should **raise** an appropriate error (see note 1 below).
4. **The main() function is provided for you!** Your code must run with the provided main function which is how your code will be tested. You may include the provided main function in your file for testing, but **only turn in your two functions in the proj08.py file**.

Deliverables
Turn in proj08.py

1. Please be sure to use the specified file name, i.e. “proj08.py” (no main function!!!)
2. Save a copy of your file in your CSE account disk space (H drive on CSE computers).
3. Submit the files using the "handin" program: http://www.cse.msu.edu/handin/webclient

Assignment Notes:

1. The **raise()** function can be used to cause an error to be thrown. It takes as an argument the name of a named error such as **KeyError, IndexError, IOError** and others. See the documentation at http://docs.python.org/tutorial/errors.html#raising-exceptions
2. The file provided is as it was from the source. There are text lines that should be ignored and the 2011 data is incomplete. Your program should handle this.
3. The **IOError** of opening a bad file name is generated automatically. However, the **KeyError** of a bad year range or the **IndexError** of a bad month range should be raised by your function.