ESCI 386 – IDL Programming for Advanced Earth Sciences Applications
Exercise #3 – Procedures and Functions

1. Write an IDL function called SPHERE that will accept a floating point argument and two keywords, /volume and /diameter. The function will do the following:

- If the keyword /volume is set the function returns the volume of the sphere. If it is missing, the function returns the surface area of the sphere.
- If the keyword /diameter is set the function assumes that the number you passed in is the diameter of the sphere. If it is missing it assumes that the value is the radius of the sphere.

I want your code to be well formatted and commented appropriately.

2. Write an IDL procedure called JULIAN that will accept an integer argument that represents a Julian date, and a single keyword, /leap_year. The procedure will do the following:

- Return two values, which are:
  - a string containing the full name of the month corresponding to the Julian date.
  - an integer containing the day of the month corresponding to the Julian date.
- If the keyword /leap_year is set, then February is assumed to have 29 days. If the keyword is not set, then February is assumed to have 28 days.
- If the user enters an invalid Julian date (less than 1, or greater than 365 for a regular year or 366 for a leap year), then have the procedure write an error message to the screen, and have the procedure return “Invalid Julian Date” in place of the month string, and a value of NaN for the day of the month integer.
- If the user enters a non-integer Julian date, have your procedure convert it to integer.

Notes:
- Your procedure will probably use a series of “if-then-endif-else-if” statements of the form
  ```idl
  if (grade eq "A") then begin
    print, "Whoo-hoo!"
  endif else if (grade eq "A-") then begin
    print, "Awesome!"
  endif else if (grade eq "B+") then begin
    print, "Pretty darn good!"
  endif else begin
    print, "Better luck next time!"
  endelse
  ```
  though there are other ways of doing it.
- If you find a particularly clever way of doing this without a series of if-then-endif-else-if statements, I will award bonus points.