CS118 Programming Assignment
Resistors

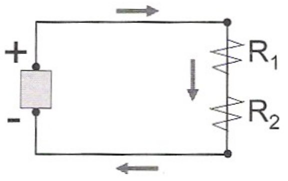
[Credit to: An Introduction to Technical Problem Solving with MATLAB v.7, Sticklen and Eskill]

For this program, we're going to introduce some standard dialog boxes. These are pre-formatted windows which allow a simple graphical user interface (GUI). For this we must import three modules: `Tkinter`, `tkMessageBox`, and `tkSimpleDialog`. (Please note the mix of cases on the names of these modules.) Most standard dialogs require two arguments: A title string, and then a message or prompt string.

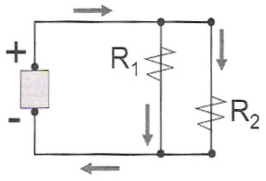
When making a GUI-oriented program a "root" window has to be constructed. But since it gets in the way, we don't want to see it. This code will start this root window and then hide it – put it at the very beginning of your program:

```
        root = Tkinter.Tk()
        root.withdraw()
```

Resistors in a circuit can be organized in *series* or in *parallel*. The diagrams below show the difference:



resistors in series



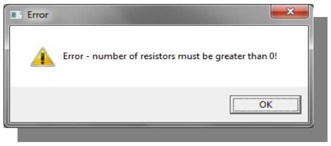
resistors in parallel

In the case of series resistors, the *effective resistance* is simply the sum of the individual resistors. For parallel resistors, the effective resistance is computed as:

$$R_{eff} = \frac{1}{\sum_{k=1}^{n} \frac{1}{R_k}}$$

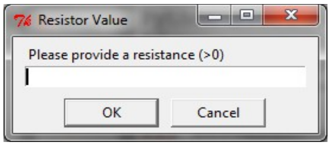
where R_k is the resistance of resistor *k*.

Write a Python script that computes the effective resistance for **parallel resistors only**. Use the `tkSimpleDialog` function `askinteger()` to ask the user how many resistors are in the circuit. Validate the input - if the provided number of resistors is not positive, use the `tkMessageBox` module's `showwarning()` function to provide a warning message as shown below and have the user provide another value until a positive value is given. Note that these dialogs are "blocking" - the remaining code will not execute until the dialog is closed.



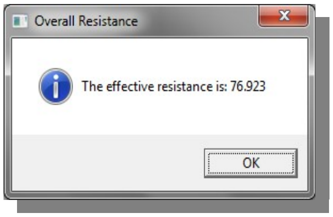
Error - number of resistors must be greater than 0!

Once the user complies, collect the values of the resistors via the `askinteger()` function and a **FOR** loop, and keep a running total (for the denominator of the formula).



Please provide a resistance (>0)

You may assume the user will only provide positive, non-zero values for the resistors. After you finish collecting the resistor values, compute the effective resistance and save it as `Reff`. Report `Reff` to three decimal places using `showinfo()` by making use of the format string syntax.



The effective resistance is: 76.923

30% Extra Credit: Write a separate program that does the same thing as the program above, but which does NOT ask the user how many resistors will be provided (and thus will not provide the associated warning dialog in that case). Instead, it collects resistors until a negative or zero value is provided. Once the negative/zero value is entered, the program should compute the effective resistance using only the positive values. An error message should show in an error dialog box (use `showerror()`) if no positive values are entered. **Submit both the base program .PY file and the .PY file of this extra credit program together in a single ZIP file.**