

Winter 2017  
Due Feb 8th

## Computer Science 1510 Assignment #3

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- This assignment requires electronic submission of your source code files. Follow the directions under “Submission Details for All Assignments” on the “Links” tab on the course webpage to submit your assignment.
  - It is not necessary to submit hard (printed) copies of your assignment.
  - Be sure to include sufficient comments in your code, and labels in your output.
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1. Write a menu-driven Fortran program that allows the user to convert measurements either from miles to kilometers, from feet to meters, or from degrees Fahrenheit to degrees Celsius. Use functions to carry out the various conversions. A sample run of the program should proceed as follows:

```
Available options are:
```

- ```
0. Display this menu.  
1. Convert miles to kilometers.  
2. Convert feet to meters.  
3. Convert degrees Fahrenheit to degrees Celsius.  
4. Quit
```

```
Enter an option (0 to see menu): 3  
Enter degrees Fahrenheit: 212  
This is equivalent to 100.0 degrees Celsius.
```

```
Enter an option (0 to see menu): 0  
Available options are:  
0. Display this menu.  
1. Convert miles to kilometers.  
2. Convert feet to meters.  
3. Convert degrees Fahrenheit to degrees Celsius.  
4. Quit
```

```
Enter an option (0 to see menu): 1  
Enter miles: 10  
This is equivalent to 16.09 kilometers.
```

```
Enter an option (0 to see menu): 2  
Enter number of feet: 1  
This is equivalent to 0.30 meters.
```

```
Enter an option (0 to see menu): 4
```

2. The square root of a positive number  $b$  can be approximated using the “divide-and-average” method as follows: starting with an initial approximation  $x$ , a new approximation is calculated as

$$\frac{x + b/x}{2}.$$

Repeat this calculation, replacing  $x$  by this new approximation, and stopping when  $x$  and  $b/x$  differ (in absolute value) by some user-specified tolerance. Write a Fortran program to implement this algorithm, with user-input values of  $b$ ,  $x$ , and the tolerance. Output the approximation for  $\sqrt{b}$  as well as the error in this approximation by using the built-in `SQRT` function.