2.11 Exercises

1. Write a small program that assigns an angle in degrees to a variable called `degrees`. The program converts this angle to radians and assigns it to a variable called `radians`. To convert from degrees to radians, use the formula $radians = degrees \times 3.14/180$ (where we are using 3.14 to approximate π). Print the angle in both degrees and radians.

   The following demonstrates the program output when the angle is 150 degrees:

   ```
   Degrees:   150
   Radians:   2.616666666666667
   ```

2. Write a program that calculates the average score on an exam. Assume we have a small class of only three students. Assign each student's score to variables called `student1`, `student2`, and `student3` and then use these variables to find the average score. Assign the average to a variable called `average`. Print the student scores and the average score.

   The following demonstrates the program output when the students have been assigned scores of 80.0, 90.0, and 66.5:

   ```
   Student scores:
   80.0
   90.0
   66.5
   Average:   78.83333333333333
   ```

3. Imagine that you teach three classes. These classes have 32, 45, and 51 students. You want to divide the students in these classes into groups with the same number of students in each group but you recognize that there may be some "left over" students. Assume that you would like there to be 5 groups in the first class (of 32 students), 7 groups in the second class (of 45 students), and 6 groups in the third class (of 51 students). Write a program that uses the `divmod()` function to calculate the number of students in each group (where each group has the same number of students). Print this number for each class and also print the number of students that will be "leftover" (i.e., the number of students short of a full group). Use simultaneous assignment to assign the number in each group and the "leftover" to variables.

   The following demonstrates the program's output:

   ```
   Number of students in each group:
   Class 1:   6
   Class 2:   6
   Class 3:   8
   Number of students leftover:
   Class 1:   2
   Class 2:   3
   Class 3:   3
   ```

4. The Python statements below have several errors. Identify the errors and correct them so that the program properly calculates the circumference of Jimmy's pie ($circumference = 2\pi r$).

```
1  pi = '3.14'
2  pie.diameter = 55.4
3  pie_radius = pie.diameter // 2
4  circumference = 2 * pi ** pie_radius
5  circumference-msg = 'Jimmy's pie has a circumference: '
6  print(circumference-msg, circumference)
```

The following demonstrates the output from the corrected program:

```
Jimmy's pie has a circumference:   173.956
```

5. Write a program that calculates the wavelength of a wave traveling at a constant velocity given the speed and the frequency. Use the formula $\lambda = v/f$, where λ (lambda) is wavelength in meters, v is velocity in meters per second, and f is frequency in Hertz (cycles per second). Print the velocity, frequency, and wavelength. Assign each of these values to a variable and use the variables in your `print()` statements.

The following demonstrates what the program prints:

```
1  The speed (m/s):   343
2  The frequency (Hz):   256
3  The wavelngth (m):   1.33984375
```