

# Week 3 Value-Returning Functions

1. Write function that receives a distance in kilometres and returns that distance in miles, where miles = kilometres x 0.6214. Test this function.
2. Write a function that receives the radius of a circle and returns the area of that circle.

$$A = \pi r^2$$

Test this function. Note: the value of PI is math.pi

3. Write a function that receives the radius and height of a cylinder and returns the surface area of the cylinder.

$$A = 2\pi rh + 2\pi r^2$$

Test the function.

4. Write a function that receives two numbers and returns the largest of these two numbers (use an if statement). You may assume both numbers are unique. Test this function.
5. Write a function that receives two strings and returns the longest of these two strings.  
Test this function.
6. Write a function that receives a first name and a surname and returns the lastname followed by a comma and space and followed by the first name e.g. if the function receives "Benjamin Sisko" it will return "Sisko, Benjamin". Test this function.
7. Make a copy of the code from (2) above.  
Add a function that receives the radius of the circle along with its area and prints a "nice" sentence to the user e.g. A circle of radius 4.0 as an area of 50.27

Referring to the examples from the lecture, add a function that reads a positive floating point number from the user.

Use this function to ask for the radius of the circle.

8. Make a copy of the code from (3) above.

Copy and paste the function your just wrote from (7) into this file.

Use this function to read the radius of the cylinder.

Use this function to read the height of the cylinder.

Add a new function that receives the radius, height and surface area and prints an appropriate sentence to the user. Test this new function.

## 9 - Using Files

Write an application that asks the user for the name of a file which contains several exam marks and writes a grade for each exam to the screen.

Use two functions

1. `read_nonempty_string()` which asks for a file name
2. `determine_grade()` which receives the exam mark and returns the relevant string "H1", "H2" etc. based on the table on the right (code from your revision files might be useful)

Grade	Comment
70+	H1
60+	H21
50+	H22
40+	Pass
<40	Fail

The `main()` function might be

```
def main():
    input_filename = read_nonempty_string("Input file name >>> ")
    input_file = open(input_filename)

    for line in input_file:
        line = line.rstrip()          # remove extra characters
        mark = int(line)              # convert to integer
        grade = determine_grade(mark) # find out the grade
        print(line + "% - " + grade)  # print

    input_file.close()
```

### Part 2

Add code to write the results to a file, whose name is specified by the user. (Re-use `read_nonempty_string()` to read the output file's name.)

Sample output file might be:

```
45% - Pass
56% - H22
34% - Fail
89% - H1
23% - Fail
45% - Pass
65% - H2
```

## Homework

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Write a program that asks the user for a **distance in meters** and offers the following menu

1. Convert to kilometres (1m = 0.001 km)
2. Convert to feet (1m = 3.28084 feet)
3. Convert to inches (1m = 39.3701 inches)
4. Quit

f read\_nonnegative\_float(prompt)  
f metres\_to\_km(m)  
f metres\_to\_feet(m)  
f metres\_to\_inches(m)  
f get\_choice()  
f process\_choice(choice, m)  
f main()

Use the functions (right) in your application:

## Homework

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Write an application that asks for and reads two coordinates (x1, y1) and (x2, y2) and calculates the distance between these two coordinates

The formula is

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Suggested functions:

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f calculate\_distance(x1, y1, x2, y2)  
f read\_float(prompt)  
f main()

where read\_float() is used four times, once for each value.

Notes:

- ⇒ \*\* is the power operator
- ⇒ math.sqrt() is the square root function
- ⇒ math requires import math