SCHOOL OF COMPUTER SCIENCES
UNIVERSITI SAINS MALAYSIA
Semester 1 Session 2021/2022

CPT 111 – Principles of Programming
Week 8 Programming Lab
Functions I

Learning Outcomes:

- Demonstrate function definition, function call and function prototypes.
- Apply void functions and value returning functions.
- Describe functions with parameters - passing by value.

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1. Is the following a function header or a function call?

```
calcTotal();
```

2. Is the following a function header or a function call?

```
void showResults()
```

3. What will the output of the following program be if the user enters 10?

```
#include <iostream>
using namespace std;

void func1()
{
   cout << "Able was I\n";
}

void func2()
{
   cout << "I saw Elba\n";
}

int main()
{
   int input;

   cout << "Enter a number: ";
   cin >> input;
   if (input < 10)
   {
      func1();
      func2();
    }
   else
   {
      func2();
      func1();
   }
   return 0;
}
```

4. The following program skeleton determines whether a person qualifies for a credit card. To qualify, the person must have worked on his or her current job for at least two years and make at least $17,000 per year. Finish the program by writing the function prototype and definitions of the functions `qualify` and `noQualify`. The function `qualify` should explain that the applicant qualifies for the card and that the annual interest rate is 12%. The function `noQualify` should explain that the applicant does not qualify for the card and give a general explanation why.

```
#include <iostream>
using namespace std;

// You must write definitions for the two functions qualify and noQualify.

int main()
{
   double salary;
   int years;
   cout << "This program will determine if you qualify\n";
   cout << "for our credit card.\n";
   cout << "What is your annual salary? ";
   cin >> salary;
   cout << "How many years have you worked at your "; cout << "current job? ";
   cin >> years;
   if (salary >= 17000.0 && years >= 2)
      qualify();
   else
      noQualify();
   return 0;
}
```

5. Indicate which of the following is the function prototype, the function header, and the function call:

```
void showNum(double num)

void showNum(double);

showNum(45.67);
```

6. Demonstrate a function definition named `timesTen`. The function should have an integer parameter named `number`. When `timesTen` is called, it should display the product of `number` times ten. (*Note*: just write the function definition. Do not write a complete program.)

7. Define the function prototype for the `timesTen` function in Question 6.

8. What is the output of the following program?

```
#include <iostream>
using namespace std;

void showDouble(int); // Function prototype

int main()
{
   int num;
   for (num = 0; num < 10; num++)
      showDouble(num);
   return 0;
}

// Definition of function showDouble.
void showDouble(int value)
{
   cout << value << "\t" << (value * 2) << endl;
}
```

9. What is the output of the following program?

```
#include <iostream>
using namespace std;

void func1(double, int); // Function prototype

int main()
{
   int x = 0;
   double y = 1.5;
   cout << x << " " << y << endl;
   func1(y, x);
   cout << x << " " << y << endl;
   return 0;
}

void func1(double a, int b)
{
   cout << a << " " << b << endl;
   a = 0.0;
   b = 10;
   cout << a << " " << b << endl;
}
```

10. The following program skeleton asks for the number of hours you've worked and your hourly pay rate. It then calculates and displays your wages. Describe function definition `showDollars`, that output of the wages.

```
#include <iostream>
using namespace std;

void showDollars(double); // Function prototype

int main()
{
   double payRate, hoursWorked, wages;
   cout << "How many hours have you worked? ";
   cin >> hoursWorked;
   cout << "What is your hourly pay rate? ";
   cin >> payRate;
   wages = hoursWorked * payRate;
   showDollars(wages);
   return 0;
}

// You must write the definition of the function showDollars
// here. It should take one parameter of the type double.
// The function should display the message "Your wages are RM"
// followed by the value of the parameter. It should be displayed
// with 2 places of precision after the decimal point, in fixed
// notation, and the decimal point should always display.
```

11. How many return values may a function have?

12. Demonstrate a header for a function named `distance`. The function should return a `double` and have two `double` parameters: `rate` and `time`.

13. Demonstrate a header for a function named `days`. The function should return an `int` and have three `int` parameters: `years`, `months`, and `weeks`.

14. Demonstrate a header for a function named getKey. The function should return a char and use no parameters.

15. Demonstrate a header for a function named lightYears. The function should return a long and have one long parameter: miles.

16. Coin Toss - Write a function named coinToss that simulates the tossing of a coin. When you call the function, it should generate a random number in the range of 1 through 2. If the random number is 1, the function should display “heads.” If the random number is 2, the function should display “tails.” Demonstrate the function in a program that asks the user how many times the coin should be tossed and then simulates the tossing of the coin that number of times.

17. Celsius Temperature Table - The formula for converting a temperature from Fahrenheit to Celsius is

    C = 5/9*(F-32)

    where F is the Fahrenheit temperature and C is the Celsius temperature. Demonstrate a function named celsius that accepts a Fahrenheit temperature as an argument. The function should return the temperature, converted to Celsius.

18. Rectangle Area: Write a program that will ask the user to enter the width and length of a rectangle and then display the rectangle’s area. The program calls the following functions:

    - getLength – This function should ask the user to enter the rectangle’s length and then return that value as a double.
    - getWidth – This function should ask the user to enter the rectangle’s width and then return that value as a double.
    - getArea – This function should accept the rectangle’s length and width as arguments and return the rectangle’s area. The area is calculated by multiplying the length by the width.
    - displayData – This function should accept the rectangle’s length, width, and area as arguments and display them in an appropriate message on the screen.