

CMPS 150 Workbook: Chapter 3

Section 3.1: Predefined Functions

1) What is the output of the following code?

a) `cout << sqrt(16) << endl;`

b) `cout << pow(5,2) * 2 << endl;`

c) `double d=-55.1;
double e;
e=fabs(d);
cout << e << endl;`

d) `double m=4.5;
cout << ceil(m) << endl;`

e) `double n=-4.5;
cout << floor(n) << endl;`

2) What is the output of the following code?

a) `cout << pow(4,3) << endl;`

b) `cout << abs(7) * 2 << endl;`

c) `int n=25;
int s;
s = sqrt(n);
cout << s << endl;`

d) `double a=3.333;
cout << floor(a) << endl;`

e) `double b=-3.333;
cout << ceil(b) << endl;`

3) Using functions from *cstdlib* and *cmath* convert the following into C++ expressions.

a) πr^2 (note: use 3.14159 for π)

b) $\sqrt{(x_1 - x_0)^2 + (y_1 - y_0)^2}$

c) $\frac{1}{4}a^2\sqrt{3}$

4) Using functions from *cstdlib* and *cmath* convert the following into C++ expressions.

a) $\sqrt{2R^2 - R\sqrt{4R^2 - a^2}}$

b) $\sqrt{\left(\frac{B-A}{C}\right)^2 + 1} + \frac{B-A}{C}$

5) What is the output of the following code?

```
int d = 5;
while (d > 0)
{
    cout << d;
    d--;
    if (d < 3)
        exit(1);
}
```

6) What is the output of the following code?

```
for (int a=1; a<10; a++)
{
    cout << a * a << endl;
    if (a%4 == 0)
        exit(1);
}
```

7) Write a program to output the area of the circles with the radii of all integers between the integers n and m . The values of n and m are to be input by the user. (area = πr^2) (note: use 3.14159 for π)

8) Write a program to output the volume of the spheres with the radii of all integers between the integers a and b . The values of a and b are to be input by the user. [area = $(4.0/3.0)\pi r^3$] (note: use 3.14159 for π)

Section 3.2: Programmer Defined Functions

1) What is the output of the following code?

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

void Square(int a);

int main()
{
    for (int x=0; x<5; x++)
        Square(x);

    return 0;
}

void Square(int a)
{
    cout << a * a << endl;
}
```

2) What is the output of the following code?

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

void Sum(int, int);

int main()
{
    for (int x=4; x<6; x++)
        for (int y=2; y<4; y++)
            Sum(x, y);

    return 0;
}

void Sum(int one, int two)
{
    cout << one + two << endl;
}
```

3) What is the output of the following code?

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

int Difference(int, int);

int main()
{
    for (int g=13; g<17; g++)
        for (int h=8; h<10; h++)
            cout << Difference(g,h) << endl;

    return 0;
}

int Difference(int one, int two)
{
    return one - two;
}
```

4) What is the output of the following code?

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

int GetBigger(int, int);

int main()
{
    int sum=0;

    for (int m=0; m<5; m++)
        sum = GetBigger(sum, m);
    cout << sum << endl;

    return 0;
}

int GetBigger(int one, int two)
{
    return one + two;
}
```

5) Write a function that receives the age of a person in years to their nearest birthday via an argument and outputs the number of days old that person was at that birthday. (Use 365 for the number of days in a year.)

6) Write a function that receives the weight of a package via an argument and outputs if that package is overweight or is of an acceptable weight. The maximum acceptable weight will be 40 kilograms.

7) Write the code to do the following:

a) Write a call to the function in #5 for a person 40 years old.

b) Write a call to the function in #5 for a person 27 years old.

c) Write the code necessary to get an age in years from the user and then call the function in #5 so that the age entered is output in days old.

8) Write code to do the following:

a) Write a call to the function in #6 for a package of 56 kilograms.

b) Write a call to the function in #6 for a package of 23 kilograms.

c) Write the code necessary to get a package weight in kilograms from the user and then call the function in #6 so that the weight of the package may be judged to be overweight or of acceptable weight.

9) Write a function that receives the length of the side of a square via an argument and returns the area of the square.

10) Write a function that receives the length and width of a rectangle via arguments and returns the area in the rectangle.

11) Write code to do the following:

a) Write a call to the function in #9 for a square with side length 5.3 meters. Your code should assign the returned value to a variable.

b) Write a program to get a side length in feet from the user and then calls the function in #9 so that the area of the square is calculated. The program should output the returned value.

- 12) Write the code to do the following:
- Write a call to the function in #10 for a rectangle of length 3.5 inches and width 2.1 inches. Your code should assign the returned value to a variable.
 - Write a program that gets the length and width in meters from the user then calls the function in #10 so that the area of the rectangle is calculated. The program should then output the returned value.
- 13) Write a function that receives the age in years of a potential driver via an argument and returns true if the person is old enough to drive (age 16 or greater). The function should return false otherwise.
- 14) Write a function that receives the height of two people via arguments and returns true if the heights are equal. The function returns false if the heights are not equal.
- 15) Write the code to do the following:
- Write a call to the function in #13 for a person 23 years old. Your code should output whether or not the person can drive.
 - Write a program that gets the age in years of a person, then calls the function in #13 to determine if that person is old enough to drive. The program should output if the person is old enough to drive or not.
- 16) Write the code to do the following:
- Write a call to the function in #14 for two people, one of which is 72 inches tall, the other being 67 inches tall. Your code should output "equal height" if they are of the same height or "not equal" if they are not of the same height.
 - Write a program that gets the height in inches of two people from the user. The program should then call the function in #14 to determine if the two people are the same height. Your program should output "equal height" if they are of the same height or "not equal" if they are not of the same height.

Section 3.3: Scope Rules

1) What is the output of the following code?

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

const int a=99;

void AllLocal(int);

int main()
{
    int a=1, b=2, c=3;
    cout << "main first:      " << a << ' ' << b << ' ' << c << endl;
    AllLocal(c);
    cout << "main last:       " << a << ' ' << b << ' ' << c << endl;

    return 0;
}

void AllLocal(int h)
{
    int a=4, b=5;
    cout << "AllLocal only: " << a << ' ' << b << ' ' << h << endl;
}
```

2) What is the output of the following code?

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

const int a=99;

void AllLocal(int,int,int);

int main()
{
    int a=1, b=2, c=3;
    cout << "main first:      " << a << ' ' << b << ' ' << c << endl;
    AllLocal(a,b,c);
    cout << "main last:       " << a << ' ' << b << ' ' << c << endl;

    return 0;
}
```

```

void AllLocal(int x,int y, int z)
{
    cout << "AllLocal first:  " << x << ' ' << y << ' ' << z << endl;
    x++; y++; z++;
    cout << "AllLocal middle: " << x << ' ' << y << ' ' << z << endl;
    int a=4, b=5, c=6;
    cout << "AllLocal last:   " << a << ' ' << b << ' ' << c << endl;
}

```

3) What is the output of the following code?

```

#include <iostream>
using namespace std;
const int a=9;

void NotAllLocal(int,int);

int main()
{
    int b=2, c=3;

    cout << "main first:           " << a << ' ' << b << ' ' << c << endl;
    NotAllLocal(b,c);
    cout << "main last:            " << a << ' ' << b << ' ' << c << endl;

    return 0;
}

void NotAllLocal(int y, int z)
{
    int a=4, b=5, c=6, x=8;

    cout << "NotAllLocal first:  " << x << ' ' << y << ' ' << z << endl;
    x++; y++; z++;
    cout << "NotAllLocal middle: " << x << ' ' << y << ' ' << z << endl;
    cout << "NotAllLocal last:   " << a << ' ' << b << ' ' << c << endl;
}

```

4) What is the output of the following code?

```

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

const int a=9;

void NotAllLocal(int,int);

```

```

int main()
{
    int a=1, b=2, c=3;
    cout << "main first:          " << a << ' ' << b << ' ' << c << endl;
    NotAllLocal(b,c);
    cout << "main last:          " << a << ' ' << b << ' ' << c << endl;
    system("PAUSE");

    return 0;
}

void NotAllLocal(int y, int z)
{
    int b=5, c=6, x=8;

    cout << "NotAllLocal first:  " << x << ' ' << y << ' ' << z << endl;
    x++;
    y++;
    z++;
    cout << "NotAllLocal middle: " << x << ' ' << y << ' ' << z << endl;
    cout << "NotAllLocal last:   " << a << ' ' << b << ' ' << c << endl;
}

```

5) What is the output of the following code?

```

for (int b=1; b<3; b++)
{
    for (int a=4; a<6; a++)
    {
        cout << a;
    }
}
cout << endl;

```

6) What is the output of the following code?

```

for (int c=1; c<3; c++)
{
    for (int b=4; b<6; a++)
    {
        for (int a=7; a<9; a++)
        {
            cout << a;
        }
    }
}
cout << endl;

```