**UNITY UNIVERSITY**

**DEPARTMENT OC COMPUTER SCIENCE**

**FUNDAMENTALS OF PROGRAMMING WORKSHEET**

**Direction**: Attempt all of the following questions individually and in group within one week starting from the time you got the worksheet document. Select those questions that needs more clarification and any support from your instructor. Discuss in class and adjust tutorial time and contact your instructor through your class representative. The tutorial time will be informed within 2 days through notice by your instructor or department.

1. A certain company plan to give a 40% of bonus to each of its employees at the end of every year for those who are working more than two years in the company. If an employee has been working ten or more years of the company, she/he to get an additional birr 100 in addition to bonus. Analyze and design the algorithm of this problem and write C++ program to calculate (compute) a bonus of an employee.
2. Write C++ program to print or display the following output

a) \* \* \* \* b) \* c) \* \* \* \*

\* \* \* \* \* \* \* \* \*

\* \* \* \* \* \* \* \* \*

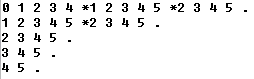
\* \* \* \* \*

d) \* e) \*

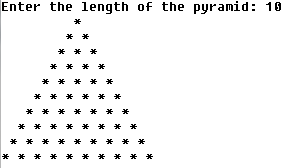
\* \* \* \* \*

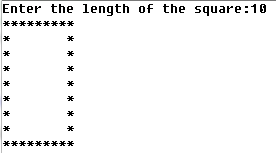
\* \* \* \* \* \* \* \*

\* \* \* \* \* \* \* \* \* \* \*



f)

g)

 h)

1. Why we use the switch statement instead of the if--else-- if selection statement in C++ programming language. Write down the reasons inside the box below?
2. Draw a flow-chart for sequential statement and selection statement or control structure used in C++ programming.
3. Flow of control is the order in which statements are executed, so the default flow of control is sequential**.** Write down the other alternative statement or structure that changes the normal flow of control in C++.
4. Write C++ program to print the following output using do---while loop
5. 70 90 110 130 150
6. Write C++ program using logical operators together with control statements, based on the given input and output information below. The program is expected to accept input of five marks such as mark1, mark2, mark3, mark4 and mark5 respectively from the user and compute the average or percentage of these five marks to indicate the status of the students.

**Input**  **Output**

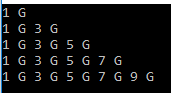
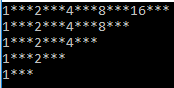
percent>=60 First Division

percent >=50 and percent <60 Second Division

percent >=40 and percent <50 Third Division

else Fail

1. Write C++ Program for the sum of n natural number using for statement. The program is expected to accept any n number from the user.
2. Write a program to calculate factorial of n number inputted by the user using for statement.
3. Write C++ program for sum of squares of n natural number inputted by the user.
4. Write C++ program to calculate sum of the first 10 even number using for statement.
5. Write a program to calculate the sum of the first 10 odd number using for statement.
6. Write separate C++ program to calculate the reverse of sum of 10 even and odd numbers using for statement.
7. Write C++ program to count the number down starting from 8 using while loop. Assuming that users enter the number 8 while running the program?
8. Write C++ program to display x character in columns and rows. The program is expected to accept number of rows, columns and type of character (x) as an input from the user.
9. Write a program to calculate sum of the first 10 natural numbers using while loop
10. Write C++ program to print even number from (0 to 30) like 0 2 4--------30 and continue the iteration of the for loop when x%2==1.
11. Define function and describe why we use function to write a real world program
12. Identify the two categories of functions in C++ and explain with examples
13. Write Separate C++ program to display the following three output.





1. Write C++ Program for the sum and average of n natural number using while Loop. The program is expected to accept any n number from the user.
2. Write C++ program to calculate factorial of n number inputted by the user using while Loop.
3. Write C++ program to calculate sum of the first 10 even number using while Loop.
4. Write a program to calculate the sum of the first 10 odd number using while loop.
5. Write separate C++ program to calculate the reverse of sum of 10 even and odd numbers using while loop
6. Write C++ program using if-else-if statement to calculate Income Tax, pension, total deduction and net payment of an employees. The program is expected to accept salary of an employee as input and displays income tax, pension, total deduction and net payment of a salary as output. Use 7% of Basic salary to compute pension. Define function for each of the operation that is performed. Use the following information for tax competition.

**Salary** **Tax**

<=600 0

6,01-1,650 10%

1,651-3,200 15%

3,201-5,250 20%

5,251-7,800 25%

7,801-10,900 30%

>10,900 35%

1. Which of the following function prototype is valid or invalid and give reasons for invalid type? Determine the return type of a function and the type of data a function accept when it is called.

long myFunction (int);

long myFunction(int x=50);

long myFunction(int =50);

long Area(int, int);

long Area(int width, int height);

void printMessage(int messageNumber);

int getNumber();

badFunction();

void getName(void);

1. Write C++ program to perform multiplication and division of two numbers by defining your own function such as mul and div to implement local and global variables and also use variables visible to only within the brace of the function defined.
2. Define all the necessary function you expect for student registration system in the university. The function you define is expected to perform its required operation when it is called from the main program.
3. Define a function by the name Vat() to calculate vat for two or more sales, serviceCharge() to calculate service charge, TotalCost() to calculate (unit price \* quantity sold) total cost before vat and TotalMoney() to calculate the sum of vat, service charge and total. Use for Loop for the user to enter multiple inputs if more than one quantity is sold and the program quite when you press 0.

**Hint**: TC=(up\*q), vat=(15%of TC), sc=(2% of TC) and TM=(TC+vat+sc).

1. Write C++ program to calculate volume of the box to implement argument passed by value when a function is called in different ways many times by declaring and necessary function.
2. Define the necessary function you expect for Bank system for saving account to register new customer, deposit money, withdraw money, determine balance and others. The functions are expected to perform its required operation when they called from the main program.
3. Declare and define a function by the name **Test(int &x, int y& , int &z)** and declare two local variables local to the function you defined. Swap the values of the parameter to themselves and to those local variables. The function return both the values of the parameter modified and the values of the variables local to this function. The program is expected to display the values passed to a function and all the returned value.
4. Explain default value in a parameter by giving examples.
5. Write C++ program to demonstrate default value in a parameter by assigning default values for about four parameters in a function prototype. The function is expected to return double of the sum of three numbers when it is called three times. Declare variables only local to main with some initial values. Call a function with initial values of the variable local to main and by considering the default values of the parameter alternatively and observe the output of the program.
6. Define a function by the name Count () and write C++ program to count a number 1 to 10 when it is called first time and 1 to 5 when it is called second time. Use for Loop to count the number repeatedly.
7. Determine the output of the following C++ program

//Program to implement Passing parameters by reference

#include<iostream>

using namespace std;

//Function prototype

void duplicate(int &a, int &b, int &c);

//Main function ()

int main() {

//Declaration of variables local to main ()

int x=5, y=3, z=7;

//Call a function and pass the memory address of the variables

//Not the value of the variable

duplicate(x, y, z);

cout<<"The value of x= "<<x<<endl;

**Output**

cout<<"The value of y="<<y<<endl;

cout<<"The value of z= "<<z<<endl<<endl;

//Call for the second time

x=10, y=9, z=15;

duplicate(x, y, z);

cout<<"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*"<<endl<<endl;

cout<<"The value of x= "<<x<<endl;

cout<<"The value of y="<<y<<endl;

cout<<"The value of z= "<<z<<endl<<endl;

x=20, y=30, z=65;

cout<<"\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*\*"<<endl<<endl;

cout<<"The value of x= "<<x<<endl;

cout<<"The value of y="<<y<<endl;

cout<<"The value of z= "<<z<<endl<<endl;

return 0;

}

//Define a function by the name duplicate()

//Any modification in the values of the parameter can change

//the value of x, y and z passed to it

void duplicate(int &a, int &b, int &c) {

a=(a\*2);

b=(b\*5)+a;

c=((c\*10)+(a+b));

}

1. Determine the output of the following C++ program. Suppose the user input the number 180 and 120 respectively.

// Program to sort two numbers using call by reference.

// Smallest number is output first.

#include <iostream>

using namespace std;

// Function prototype for call by reference

float swap(float &x, float &y);

int main() {

//Declaration of variables local to main ()

float a, b;

//Users input the value of a and b

cout<<"Enter the value of two numbers:";

cin>>a>>b;

//Ensure the value of (a>b)entered by the user

if(a>b)

//call swap ()

**Output**

swap(a,b);

cout<<"The Sorted numbers of a: "<<a<<endl;

cout<<"The Sorted numbers of b: "<<b<<endl;

cout<<"The value of temp:"<<b<<endl;

return 0;

}

// A function definition for call by reference

// The variables x and y will have their values changed.

float swap(float &x, float &y){

float temp;

//Assign the value of x to temp

temp=x;

x=y;

y=temp;

return (y);

}

1. Determine the output of the following C++ program

#include<iostream>

using namespace std;

//Main Function ()

int main (){

//Declaration of Variables and initialized to 1

**Output**

int i=1;

//Do While Loop

do {

//Declaration of Variable by num and initialized to 1

int num=2;

//For Loop to iterate the body of the loop until j<=i

for(int j=2; j<=i; j++) {

//Inner for Loop

cout<<(num)<<" "<<"@"<<" ";

num=(num+2);

}//End of For Loop

//Outer for Loop

cout<<endl;

//Increment the value of i

i++;

} //End of do while ()

while (i<=5);

}

1. Determine the output of the following C++ code and write your answer inside the box provided to the right of the program.

#include<iostream>

using namespace std;

int main (){

**Output**

//For Loop to iterate the body of the program

for (int i = 1; i < 5; i++) {

//Declaration of Variables and initialized to 0

int j=0;

//While Loop to iterate until j<i

while (j< i) {

//Body of the While Loop

cout<<"J="<<(j)<<" "<<endl;

//Increment j at each iteration of the loop

j++;

cout<<"###\*\*\*$$$"<<endl;

}//End of while Loop

}//End of For Loop

return 0;

}//End of main ()

1. Read the following C++ code carefully and identify the syntax errors you observed and write your answer inside the box provided under this question

//C++ program to demonstrate default parameter values

#include <iostream>

using namespace std;

//Function declaration with default parameter values for width and height

int VolumeBox(int length, int width=25, int height=1);

//Main Function ()

int main() {

//Declaration of Variables local to main with initial values

int length;

int height;

Declaration of variable vol to store the return value

Call a function and pass the value 10, 5 and 2 respectively

vol=VolumeBox(length, width);

cout<<"Volume of 1st Box:"<<vol<<endl;

//Call a function for the second time by passing 10 and 5

//And use the default parameter value of height=1

vol=VolumeBox(length, width);

**Syntax Errors**

cout<<"Volume of 2nd Box:"<<vol<<endl;

//Call a function for the third time by passing 10 only

//And use the default parameter value of width and height

vol=VolumeBox(length);

cout<<"Volume of 3rd Box:"<<vol<<endl;

return 0;

}

//Define a function VolumeBox to accept the values passed to it and

//Use the default parameter value depending on the no of argument passed to

int VolumeBox(int length, int width, int height) {

int vol;

vol=(length\*width\*height);

return (vol);

}

1. Identify the syntax errors you observed for the following C++ code or program and write your answer inside the box provided under this question.

//Program to demonstrate function overloading

#include<iostream>

using namespace std;

//Declaration of Function Overloading

int Double(int, int);

long Double(long);

float Double(float);

double Double(double);

//Main Function

int main (){

int a,b;

long y;

float m;

//Users Assign a value of each variable

cout<<"Enter a and b:";

cin>>a;

cout<<"Enter y:";

cin>>y;

cout<<"Enter m:";

cin>>m;

cout<<"Enter n:";

**Syntax Errors**

cin>>n;

//Call Functions

x=Double(x,a);

cout<<"X and a="<<x<<"\n";

y=Double(y);

cout<<"Y="<<y<<"\n";

m=Double(m);

cout<<"M="<<m<<"\n";

n=Double(n);

cout<<"N="<<n<<"\n";

return 0;

}//End of Main()

//Define Function Overloaded

int Double(int x, int a){

return x\*a\*2;

}

long Double(long y){

return y\*2;

}

float Double(float m){

return 2\*m;

}

double Double(double n) {

return 2\*n;

}

1. Identify the syntax errors you observed for the following C++ code or program and write your answer inside the box provided under this question.

//Program to demonstrates inline functions

#include<iostream>

**Syntax Errors**

//Declaration of inline function

int Double(int);

int main() {

//Declaration of variables local to main

//Users assign the value of the variable

cout << "Enter a number to work with: ";

cin >> target;

//Call a function for the first time

target = Double(target);

cout<<"Target: "<<target<<endl;

//Call a function again

target = Double(target);

cout<<"Target:"<<target<<endl;

//Call a function

target=Double(target);

cout<<"Target: "<<target<<endl;

}

inline int Double(int target) {

sor=(2\*target);

return (sor);

}

1. Write any C++ program to demonstrate recursion function and give reasons to use recursion in C++ programming
2. Write any C++ program to demonstrate Overloading Function and write advantages of using overloading function in programming.
3. Write any C++ program to implement inline function and give reasons why we use inline function in programming.
4. Write the difference between local and global variables by giving simple example. Explain shortly if the block of a function defines a variable with the same name as a global variable.
5. Write the difference between passing argument by value and by reference by giving examples. Which one is best to develop reliable software and why?
6. Give your reasons why the name of the default parameter in the prototype need not be the same as the name in the function header.
7. How do you assign a default value to a parameter if a function prototype looks like the following?

**long myFunction (int par1, int par2, int par3);**

1. Write a function to check whether a number is prime or not using recursive. Suppose the program is expected to accept input from the user.
2. Write C++ program to calculate the sum of n natural number inputted by the user. The program is expected to implement recursion and use for loop to repeatedly iterate.
3. Write C++ program to calculate the square of n natural number three times if a function call itself.