**CSci 1500 - Assignment 14**

**What you need to turn in:** Write your pseudocode or your C++ code or your Python code for each of the problems, in this document after the given problem. Also save, compile and run your C++ code. Upload this document with your code added and the \*.cpp file and the \*.py to the dropbox.

1. (10 pts) A triangle ABC is inscribed in a circle, that is, the vertices of the triangle are the circumference of the circle. Suppose the triangle ABC divides the circumference into lengths a, b, and c inches. Design an algorithm and write the pseudocode that asks the user to specify the values of a, b, and c and then calculates the radius of the circle. Note if r is the radius of the circle, then 2πr = a + b + c

Variables: a, b, c (int) => stores the user input arc lengths.

radius (int) => stores the calculated radius r = (a+b+c)/(2pi)

pi (const double) => stores the approximated value pi, 3.141593

Solution: Prompt user “Enter the length of arc a: “

Store to a

Prompt user “Enter the length of arc b: “

Store to b

Prompt user “Enter the length of arc c: “

Store to c

Assign radius to (a+b+c)/(2pi)

Display “The radius of the circle is [radius]”

1. (10 pts) Write a C++ program to implement and test the algorithm that you designed in the previous exercise. You may assume that the value of π = 3.141593 is constant.

#include <iostream>

using namespace std;

int main ()

{

//Declare variables and define constants.

double a, b, c, radius;

const double PI = 3.14593;

//Prompt user for arc lengths and store to variables.

cout << "Enter the length of arc a: " << endl;

cin >> a;

cout << "Enter the length of arc b: " << endl;

cin >> b;

cout << "Enter the length of arc c: " << endl;

cin >> c;

//Calculate the radius and store to variable.

radius = (a+b+c)/(2\*PI);

//Output the result to the user.

cout << "The radius of the circle is " << radius << endl;

return 0;

}

1. (10 pts) Now write a Python program to implement and test the same algorithm.

#Import math to use PI

import math

def main():

''' Prompt user for 3 arc lengts of a circle, calculate the radius,

and display it to the user.

'''

#Prompt user for input and store o variables.

a = int(input("Enter the length of arc A: "))

b = int(input("Enter the length of arc B: "))

c = int(input("Enter the length of arc C: "))

#Calculate the radius of the circle.

radius = (a+b+c)/(2\*math.pi)

#Return the result to the user.

print("The radius of your circle is", str(radius))

main()

1. (10 pts) Write a program that will compute the surface area and the volume of a box. The program should prompt the user to enter the length, width, and height of the box (all in inches), read these numbers, and then calculate and display the box surface area and volume. Note: Box surface area = 2(*lw* + *lh* + *wh*) and box volume = *lwh*, where *l* = box length, *w* = box width, and *h* = box height. You should assume that the box length, width, and height entered will be positive integer values. Here is what output should look like from running the program (user input is shown in bold):

Enter box length, width, and height (inches): **6 2 9**

Box surface area = 168 square inches

Box volume = 108 cubic inches

#include <iostream>

using namespace std;

int main()

{

//Declare variables.

int length, width, height;

//Prompt user for input and define variables.

cout << "Enter the length of the box: " << endl;

cin >> length;

cout << "Enter the width of the box: " << endl;

cin >> width;

cout << "Enter the height of the box: " << endl;

cin >> height;

//Display results to user.

cout << "Box surface area = " << 2\*(length\*width + length\*height + width\*height) << " square inches." << endl;

cout << "Box volume = " << length\*width\*height << " cubic inches." << endl;

return 0;

}

1. (10 pts) Write a program that receives a series of numbers from the user and allows the user to press the enter key to indicate he or she is finished providing inputs. After the user presses the enter key the program should print the sum of the numbers and their average.

//Include modules and namespace

#include <iostream>

#include <string>

#include <sstream>

using namespace std;

int main()

{

//Declare variables

string currentTerm = "";

int sum, counter, currentNum;

//Define variables

sum = 0;

counter =0;

//Start loop to continuously prompt user for input.

while (true) {

//Prompt user for input and store to variable

cout << "Please enter a positive number or press enter to quit: ";

getline(cin,currentTerm);

//Check if input is valid, display result if not, continue loop if it is.

if (currentTerm == "") {

cout << "The sum of the numbers you entered is " << sum << " and the average is " << sum/counter << endl;

return 0;

}

else {

stringstream(currentTerm) >> currentNum;

sum = sum + currentNum;

counter++;

}

}

}