# **Assignments**

Note:

* Assignments are worth **1 mark each** unless specified otherwise.
* Assignments worth more than 1 mark will have a mark value indicated by a number in a box to its left.
* Please save your assignments in your CS 120 folder using the filename indicated

Assignment #1 (simple output)

**(Manual:** [[The Main Function](Chapter 2.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch2%20Main%20Function.doc)**)**

1. **filename:** A1A

Open a Win32 Console Application in C++. Enter the following code. Some of the code will already exist when you start. Leave the existing code in the program, simply add the new code to the existing code. Run the program to make sure that it works. ***Change the program*** so that it says hello to you.

**// a sample program to say hello**

**//**

#include "stdafx.h"

**#include <iostream.h>**

int main(int argc, char\* argv[])

{

**cout << “Hello Programmer”;**

return 0;

}

Assignment #2 (simple input /output)

(Manual: [[Input and Output (using cin and cout)](Chapter 3.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch3%20%20IO.doc))

1. **filename:** A2A

Write a program that will ask the user for their grade and age.   
Print the information on the screen.

Assignment #3 (Math operators and variables)

(Manual: [[Variables and Constants](Chapter 4.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch4%20Variables.doc), [[Operators](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch5%20Operators.doc)](Chapter%205.doc))

1. **filename:** A3A

Input 2 integer numbers, calculate and display the sum, product, quotient, difference, and average. Declare all your variables, ***except*** your variable for the quotient, as type integer. ***Test your program with*** the following numbers :

a) 10 and 2 b) 8 and 3

**Note** : When you have errors with the quotient in part b), remember to CAST your variables. (See [[Casting Data Types](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch6%20Casting.doc)](Chapter%206.doc))

1. **filename:** A3B

Input two points (x1,y1) and (x2,y2). Determine the following :

1. Slope 

2. Distance between the two points. 



3. Midpoint 

Use C++'s **pow** function for exponentiation (see [[Appendix A — Math Functions](AppendixA Math Functions.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\AppendixA%20Math%20Functions.doc))

1. **filename:** A3C

Input the length of the side of a square and calculate the following :

1. Area 2. Perimeter 3. Length of the diagonal.
   1. **filename:** A3D

The solution to any quadratic equation ax2 + bx + c =0 can be solved using the quadratic formula : 

Input 3 numbers a,b and c for the quadratic equation and then calculate x1and x2 using the quadratic formula . Test your program with the following numbers:

a) a = 1, b = -2 , c = 1 x1 =1 and x2= 1 b) a = 6, b = 1, c = -1 x1 =1/3 and x2= -1/2

3.5 **filename:** A3E

Write a program to determine angle A using the Law of Cosines: 

Test your program with the following numbers :

a) a= 5, b = 4, c = 3 , angle A = 90° b) a= 12.17, b = 6, c = 8 , angle A = 120°

Assignment #4 (For Loops, Conditional loops)

(Manual: [[Loops](Chapter 7.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch7%20Loops.doc))

1. **filename:** A4\_1

Use a loop to print the sum of the even numbers from 2 to 30.

1. **filename:** A4\_2

Use a loop to find the product of the odd numbers from 1 to 15.

1. **filename:** A4\_3

Use a loop to print the alphabet forwards and then backwards. (*Hint*: Saying the alphabet is a lot like counting.)

1. **filename:** A4\_4

Calculate the value of π using the infinite series π =

Ask the user for the number of terms to be calculated and then print the answer. Repeat the program until the user decides to stop.

Assignment #5 (Decision Structures)

(Manual: [[Decisions](Ch8 Decisions.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch8%20Decisions.doc))

1. **filename:** A5A

Input two number. Determine which of the two numbers is bigger and which one is smaller. Have the program repeat until the user decides to stop.

1. **filename:** A5B

Input a number. Write a program that displays each digit on a separate line. Have the program repeat until the user decides to stop.

Ex. Enter a number : 156

The digits are :

1

5

6

**5.3 filename:** A5C

A palindrome is a number that reads the same forwards and backwards. Input a 5-digit number and determine if it is a palindrome. Have the program repeat until the user decides to stop.

Test your program with the following :

1. 12321, yes b) 55555, yes c) 12327, no
   1. **filename:** A5D

Convert a number from binary to decimal.

Ex. 53756 in base 10 represents 5 x 104+ 3 x 103+ 7 x 102+ 5 x 101+ 6 x 100

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 104= 10000 | 103 = 1000 | 102 = 100 | 101 = 10 | 100 = 1 |
| 5 | 3 | 7 | 5 | 6 |

Ex. 1001 in base 2 represents 1 x 23+ 0 x 22+ 0 x 21+ 1 x 20 = 9

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 24 = 16 | 23 = 8 | 22 = 4 | 21 = 2 | 20 = 1 |
| 0 | 1 | 0 | 0 | 1 |

Ex. 11101 in base 2 represents 1 x 23+1 x 24+ 1 x 22+ 0 x 21+ 1 x 20 = 29

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| 24 = 16 | 23 = 8 | 22 = 4 | 21 = 2 | 20 = 1 |
| 1 | 1 | 1 | 0 | 1 |

Test your program with the following :

1. 111111, answer = 63 b) 1010, answer = 10 c) 100100, answer = 36
   1. **filename:** A5E

Write a program to determine if a number is prime. Modify your program to ask the user for a number and print all the prime numbers up to that integer.

* 1. **filename:** A5F

Write a program that asks the user for an integer and then prints out all its factors.

Ex. 150 = 2x3x5x5

* 1. **filename:** A5G

Design a game to simulate the game of rock ,paper, scissors. The user will play the computer. Output who won each round and why. Repeat the program until the user decides to stop.

Assignment #6 (Arrays)

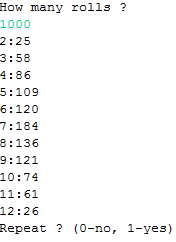
(Manual: [[Arrays](Ch9 Arrays.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch9%20Arrays.doc),  [[Appendix C — Formatting Output](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\AppendixC%20Formatting%20Output.doc)](AppendixC%20Formatting%20Output.doc) )

1. **filename:** A6A

Create an array to store the first 20 primes. Print the array

1. **filename:** A6B

Modify your previous program and ask the user for an integer and then prints out all its factors. Use the array to speed up that calculations.



* 1. **filename:** Assignment6C

Write a program to simulate the rolling of two dice. A roll is simulated by generating a

random number from 1 to 6. The sum of the two numbers should be calculated. Each die

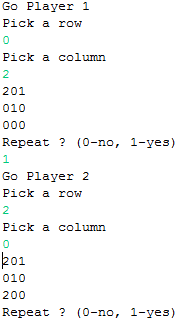
can show a number from 1 to 6 so the totals will vary from 2 to 12.Use a one

dimensional array to tally the number of times each possible sum appears. Ask the user

for the number of rolls and then display the frequency count.

Allow the user to repeat

the program.



* 1. **filename:** Assignment6D

Create a very basic tic tac toe game using a

3x3 array. This is a two player game where

each player must specify a row and a column

and the appropriate marker is placed in that

row and column. You may assume that

players are smart enough to not ask for an

already occupies space. At the end of each

move,display the board.

**6.5 filename:** A6E

Modify your previous program to have the computer determine when someone has won the game. At the end of each game the program should clearly indicate which player won or if the game resulted in a tie.

Assignment #7 (Strings)

(Manual: [[Strings](Ch10 Strings.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch10%20Strings.doc))

1. **filename:** A7A

Create a password application that stores a secret password of your choice. The password application should prompt the user for the password and then display “Welcome” if the correct password is types. If after three tries the correct password has not been entered, the message “Access denied” should be displayed.

1. **filename:** A7B

Write a program that will prompt the user for a sentence and a string. The program should then remove every occurrence of the string from the sentence.

Ex. Enter a sentence : I hope you have a really great day.

Enter a string : really

Final sentence : I hope you have a great day.

1. **filename:** A7C

Write a program to input a series of characters from the keyboard. Print each character individually with an indication of the type of symbol. The program should indicate if the symbol is : digit, lower case letter, uppercase letter, whitespace character or a control character.

* 1. **filename:** A7D

Write a program to determine if a string is a palindrome. A palindrome is a string that reads the same forwards and backwards.

Ex.

Madam, I’m Adam.

Able was I ‘ere I saw Elba.

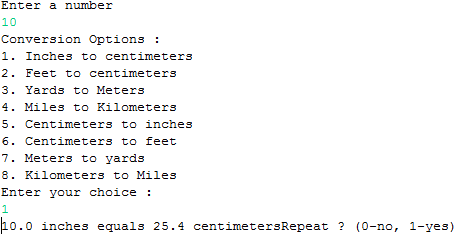
A man, a plan, a canal, Panama.

Racecar.

Your program must disregard all spaces and punctuation and consider upper and lower case letters to be equivalent. Hint: When you are ready to test for a palindrome, make a copy of the string in reverse and compare the two strings.

Assignment #8 (Functions)

(Manual: [[Modular Programming With Functions](Ch11 Functions.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch11%20Functions.doc))



1. **filename:** A8A

The following formulas can be used to convert English

units of measurement to metric units

Inches \* 2.54 = centimeters

Feet \* 30 = centimeters

Yards \* 0.91 = meters

Miles \* 1.6 = kilometers

Create a program that displays a menu of conversion

choices and then prompts the user to choose a

conversion. The program should have separate functions for each conversion while the mainline contains the menu.

1. **filename:** A8B

Write a program that will convert a numeric grade to a letter grade. Put the grade conversion into a function.

Add a function to determine if the input is valid. Repeat the program until the user decides to quit.

Ex. Enter a number grade : 98

Letter grade : A

Enter a number grade : 106

Letter grade : invalid

1. **filename:** A8C

Write a program using functions that will determine if an integer is a perfect integer. A perfect integer is a number which is equal to the sum of all its factors except itself.

Ex. 6 is a perfect number because 6 = 1 + 2 + 3

Test your program with the following :

1. 6, perfect b) 10, not perfect c) 28, perfect d) 8128, perfect

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  |  |  |  |  |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

Assignment #9 (Structures)

(Manual: [[Structures](C:\\Users\\duffykam\\AppData\\Roaming\\Microsoft\\Word\\Ch12 Structures.doc)](file:///C:\Users\duffykam\AppData\Roaming\Microsoft\Word\Ch12%20Structures.doc))

* 1. **filename:** A9\_1

Create a structure to hold the name, number of moons and distance from the sun of a single planet. Create an array using this structure to store the following information. Design a menu that allows the user to choose a planet and view the information associated with that planet. Allow the user to repeat the program as often as they wish.

|  |  |  |
| --- | --- | --- |
| **Planet** | **Moons** | **Distance** |
| Mercury | 0 | 58 |
| Venus | 0 | 108 |
| Earth | 1 | 150 |
| Mars | 2 | 228 |
| Jupiter | 16 | 778 |
| Saturn | 18 | 1427 |
| Uranus | 15 | 2869 |
| Neptune | 8 | 4498 |
| Pluto | 1 | 5900 |

* 1. **filename:** A9\_2

Create a structure to store information regarding a student. The structure should store the name, grade , age and phone number. Create an array using this structure to store the following information. Design a menu that allows the user to choose a student and view the information associated with that student. Allow the user to repeat the program as often as they wish.

|  |  |  |  |
| --- | --- | --- | --- |
| Andrew Smith | 12 | 17 | 386-1234 |
| Betty Jones | 10 | 15 | 386-1122 |
| Carmen Lee | 12 | 18 | 386-9876 |
| David Doe | 11 | 16 | 386-9988 |
| Erica Kelly | 11 | 17 | 386-5678 |

* 1. **filename:** A9\_3

Write a program to sort the following data according to the numbers of goals scored, points and then according to alphabetical order.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | [Player](http://www.nhl.com/nhlstats/app?fetchKey=20083ALLSASAll&page=Stats&service=page&sort=player.properName&viewName=points) | [Team](http://www.nhl.com/nhlstats/app?fetchKey=20083ALLSASAll&page=Stats&service=page&sort=team.displayAbbrev&viewName=points) | [G](http://www.nhl.com/nhlstats/app?fetchKey=20083ALLSASAll&page=Stats&service=page&sort=goals&viewName=points) | [A](http://www.nhl.com/nhlstats/app?fetchKey=20083ALLSASAll&page=Stats&service=page&sort=assists&viewName=points) | **P** |
| 1 | [Henrik Zetterberg](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8468083) | DET | 11 | 10 | 21 |
| 2 | [Sidney Crosby](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8471675) | PIT | 4 | 17 | 21 |
| 3 | [Marian Hossa](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8466148) | PIT | 9 | 10 | 19 |
| 4 | [Pavel Datsyuk](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8467514) | DET | 9 | 10 | 19 |
| 5 | [Evgeni Malkin](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8471215) | PIT | 9 | 10 | 19 |
| 6 | [Mike Ribeiro](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8467371) | DAL | 3 | 14 | 17 |
| 7 | [Daniel Briere](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8464975) | PHI | 9 | 7 | 16 |
| 8 | [Johan Franzen](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8471309) | DET | 12 | 3 | 15 |
| 9 | [R.J. Umberger](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8469469) | PHI | 10 | 5 | 15 |
| 10 | [Brenden Morrow](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8466160) | DAL | 9 | 6 | 15 |
| 11 | [Ryan Malone](http://www.nhl.com/nhl/app?service=page&page=PlayerDetail&playerId=8467988) | PIT | 6 | 9 | 15 |

Assignment #10 (Classes)

(Manual: )

**10.1 filename:** A10A

Write a program using a class to store data from a bank card. Record the bank balance and pin number. Write functions to check the pin number, display the bank balance, make a deposit or a withdrawal.

**10.2 filename:** A10B

Write a program using an array of classes to store information (country name, population, area, languages spoken ) regarding 3 countries. The program should allow the user to view data or search for information.

Ex. List all countries with a population over 10000000.

**10.3 filename:** A10C

Write a program to simulate the game of almost poker. Use a class to display the cards of the player, the computer and determine who wins the round. The program should have functions to check for one pair, two pair, three of a kind and four of a kind.

Assignment #11 (Files)

(Manual: )

**11.1 filename:** A11\_1

Write a program that will open a file for output. Write 10 different integers to the file and close the file. Open the file for input. Find the largest and smallest integer and write the numbers on the screen.

Test your program with the following data : 5, 9, 7, 10, 2, 4, 1, 6, 3, 8

**11.2 filename:** A11\_2

Open the file from the last program and determine the average of the numbers. Use a function to determine the average.

**11.3 filename:** A11\_3

Write a program that will open a file for output. Type a sentence and close the file. Then open the file for input. Input the sentence and print the sentence on the screen.

**11.4 filename:** A11\_4

Write a program that will open a file for output. Type a sentence and close the file. Then open the file for input. Input the sentence , convert the letters to upper case and save them in a new file.

Note : To convert letters to uppercase, one at a time use: toupper(letter)

You will need to include library: #include <ctype.h>

**11.5 filename:** A11\_5

Use notepad to type in a long paragraph. Write a program to open the file, convert the letters to upper case and save the new paragraph in a new file.

**11.6 filename:** A11\_6

Use notepad to type in a paragraph. Write a program to open a file, count the number of times each letter of the alphabet appears and print this information.