C++ Cheat Sheet

Class: CSCI 1300

General Reminders

# include "myfile.h"	Include file.
rand()	Random int (# include<cstdlib>).
int(var)	Convert a primitive data type var to int.
float(var)	Convert a primitive data type var to float.
double(var)	Convert a primitive data type var to double.
static_cast<t>(var)	Convert **var** to the type **t**.
void myF() const	read only fonction.
inline	the whole code of the inline function is inserted or substituted at the point of its call during the compilation.
sizeof(var)	return the number of bytes used by the variable. **sizeof** is a compile-time operator.
ternary Opearator	condition ? ifTrue : ifFalse

Strings

str[i]	Get or set the char at the index i.
str.length()	Return the number of characters.
str.substr(a,b)	Returns the substring from a to b.
str.find(subStr)	Retrun the start index of the substring
str.replace(i,l,str)	Replace substring from i with str
stoi(str)	Convert a string to int(# include<string>).
to_string(var)	Convert var to a string(# include<string>).

Arrays

0	1	...	n
"Max"	"Tom"	...	arr[n]

This table illustrate the structure of an array of strings. Considering that n is equal to the number of element minus one. Arrays are a static data type.

int arr[4];	Create a array of int and with 4 element.
int arr[4]={6,3};	
arr[i]	Get or set the element at the index i.

Vectors

# include<vector>	Include vector library.
vector<type> V;	Instantiate a vector.
vector<type> V(size);	Instantiate a vector from Array obj.
vector<type> V{6,3,3};	Instantiate a vector from Array.
V = vector<type>();	Re-instantiate V
V.at(Index)	Returns the element at index i.
V.size()	Return the number of elements.
V.push_back(Value)	Add the new element at the end.
V.pop_back()	Remove the last element.
V.clear()	Empty the vector.
V.insert(Index, Value)	Insert element at i.

Structures

```
struct myStruct {
    string param1;    // atribute 1
    double param2;   // atribute 2
}s1, s2;            // myStruct instances
```

code	*description*
myStruct Obj;	instantiate structure object.
Obj.param1	Access param1 of Obj.

Streams

# include<fstream>	Include stream library.
# include<sstream>	Include string stream library.
ifstream fin;	Instantiate a input stream.
ofstream fout;	Instantiate a output stream.
stringstream s(myStr);	Instantiate a string stream.
myS.open("file.txt")	Open txt file whith the stream.
myS.close()	Close the stream file.
getline(fin, line)	Get the next line from fin.
fout<<"hello"	Output in stream "helloWorld".
fin>>var	Input from stream to var.
<<setprecision(n)<<	Set decimal points (#include<iomanip>)
<<setw(n)<<	Establishes a print field of n spaces.
<<fixed<<	Display floating point numbers in fixed. point notation.
<<showpoint<< <<noshowpoint<<	Enables or disables the unconditional inclusion of the decimal point character in floating-point output.
<<left<<	output the string on the left.
<<right<<	output the string on the right.

clear buffer

The buffer must be cleared after after getting an input from a stream if you input and output in the same file at the same time.

```
if(cin.fail() == true) {
    cout << "cin failed state";
    cin.clear();
    cin.ignore(1000, '\n');
}
```

cmath

# include<cmath>	Include cmath library.
sqrt(x)	Square root of x.
pow(x, y)	x raised to the power y.
abs(x)	Absolute value overloads.
floor(x)	Greatest integer $\leq x$.
ceil(x)	Smallest integer $\geq x$.
fmod(x, y)	Floating-point remainder of x/y.

Error Handling

```
try {
    // risky operation
} catch (exceptions) {
    // runs if an exception of type Ex is thrown
}
```

# include<cassert>	Include assert library.
# include<stdexcept>	Common standard exceptions.
throw myException	Throw an error of type myException.
exception::what()	Retrieve diagnostic message.
catch (const auto& e)	Catch exceptions by const reference.
catch(...)	Fallback handler; rethrow if unsure.
exception	Parent of all exceptions class.

Object Oriented Programing(OOP)

```
class myClasses :public parentClass{
    private:
        // private methods and variables
    public:
        // public methods and variables

        myClasses(int p1, int p2){
            // Body of constructor
        }

        ~myClasses(){
            // Body of destructor
        }
};
```

myClasses myObj(3,5);	Instantiate an myClasses type obj.
myClasses myObj;	Call the default constructor.
protected:	similar to private, but it can also be accessed in the inherited class.

OOP With header file

If you use a header the file wich contain the main function must include the header file.

Header file(myHeader.h)

```
#ifndef MYCLASS_H //if no def for MyClass
#define MYCLASS_H //else

using namespace std;

class MyClass{
    public:
        MyClass(); //default constructor
        MyClass(p1, p2); //parameterized constructor
        int publicAtribute;
        void myFunction() const;
    private:
        int privAtribute;
};
#endif
```

Class file(.cpp)

```
#include<iostream>
#include "myHeader.h"

MyClass::MyClass(){
    publicAtribute = 0;
    privAtribute = 0;
}

MyClass::MyClass(int p1, int p2){
    publicAtribute = p1;
    privAtribute = p2;
}

void MyClass::myFunction() const{
    // my code
}
```

Switch case

```
switch (x){
    case 0:
        /*Code in case 0*/
    break;
    ⋮
    case n:
        /*Code in case n*/
    break;
    default:
        /*Code if no case match*/
}
```

Pointer & References

int* myInt;	* means myInt work form a pointer.
new	dynamically allocate a block of memory.
delete	release dynamically allocated memory.
NULL	Macro that referens to null pointer.
∗var	Get var value, where var is a pointer.
&var	Get memory addresse of **var**.
void* var	Pointer with no associated data type.

Lambda Expression

```
    ... = [captureClause] (parameters) -> returnType {
    // definition
    }
```

[&]	capture all external variables by reference.
[=]	capture all external variables by value.
$[a, \&b]$	capture 'a' by value and 'b' by reference.

Important ASCII Conversions

ASCII	*int*	ASCII	*int*	ASCII	*int*	ASCII	*int*	ASCII	*int*
A	65	a	97	N	78	n	110	0	48
B	66	b	98	O	79	o	111	1	49
C	67	c	99	P	80	p	112	2	50
D	68	d	100	Q	81	q	113	3	51
E	69	e	101	R	82	n	114	4	52
F	70	f	102	S	83	s	115	5	53
G	71	g	103	T	84	t	116	6	54
H	72	h	104	U	85	u	117	7	55
I	73	i	105	V	86	v	118	8	56
J	74	j	106	W	87	w	119	9	57
K	75	k	107	X	88	x	120		
L	76	l	108	Y	89	y	121		
M	77	m	109	Z	90	z	123		