IC210: Introduction to Computing

Fall AY2015 – 6-Week Exam

Individual work.
Closed book. Closed notes.
You may not use any electronic device.
Your answers must be legible to receive credit.

On the front of every sheet, legibly write your

Name: _____, Alpha: _____, Section Number: _____

ASCII Table for Printable Characters

Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char	Dec	Hex	Char
32	20		46	2e	.	60	3c	<	74	4a	J	88	58	X	102	66	f	116	74	t
33	21	!	47	2f	/	61	3d	=	75	4b	K	89	59	Y	103	67	g	117	75	u
34	22	"	48	30	0	62	3e	>	76	4c	L	90	5a	Z	104	68	h	118	76	v
35	23	#	49	31	1	63	3f	?	77	4d	M	91	5b	[	105	69	i	119	77	w
36	24	$	50	32	2	64	40	@	78	4e	N	92	5c	\	106	6a	j	120	78	x
37	25	%	51	33	3	65	41	A	79	4f	O	93	5d	]	107	6b	k	121	79	y
38	26	&	52	34	4	66	42	B	80	50	P	94	5e	^	108	6c	l	122	7a	z
39	27	'	53	35	5	67	43	C	81	51	Q	95	5f	_	109	6d	m	123	7b	{
40	28	(	54	36	6	68	44	D	82	52	R	96	60	`	110	6e	n	124	7c	|
41	29	)	55	37	7	69	45	E	83	53	S	97	61	a	111	6f	o	125	7d	}
42	2a	*	56	38	8	70	46	F	84	54	T	98	62	b	112	70	p	126	7e	~
43	2b	+	57	39	9	71	47	G	85	55	U	99	63	c	113	71	q			
44	2c	,	58	3a	:	72	48	H	86	56	V	100	64	d	114	72	r			
45	2d	-	59	3b	;	73	49	I	87	57	W	101	65	e	115	73	s			

Operator Name	**Associativity**	**Operators**
Primary scope resolution	left to right	::
Primary	left to right	() [ ] . -> dynamic_cast typeid
Unary	right to left	++ -- + - ! ~ & * (*type_name*) sizeof new delete
C++ Pointer to Member	left to right	.*->*
Multiplicative	left to right	* / %
Additive	left to right	+ -
Bitwise Shift	left to right	<< >>
Relational	left to right	< > <= >=
Equality	left to right	== !=
Bitwise AND	left to right	&
Bitwise Exclusive OR	left to right	^
Bitwise Inclusive OR	left to right	|
Logical AND	left to right	&&
Logical OR	left to right	||
Conditional	right to left	? :
Assignment	right to left	= += -= *= /= <<= >>= %= &= ^= |=
Comma	left to right	,

1. [10pts] Here's a typical command you might give to compile a program:

   g++ mysolver.cpp -o solve

   a. Circle all that apply for **mysolver.cpp**:

      is machine/object code, is plaintext, is a compiler, is encrypted, is a file, is source code

   b. Circle all that apply for **solve**:

      is machine/object code, is plaintext, is a compiler, is encrypted, is a file, is source code

   c. What command would you give to run the program created by the line above?

      _____

2. [20pts] Assume the following delcarations fill in the table. **Note:** each expression should be taken as independent. I.e. if one expression modifies some variable values, those modifications do not carry over to the next expression.

```
int k = 3;
int m = 10;
double x = 2.5;
char c = 20*k + 2;
string s = "bye";
```

expression	type	value
c == 'Q'		
c = 'Q'		
c + k		
!(m > 15)		
m / k		
k * x		
m % k		
m/4 < x		
s != "hi" || s != "bye"		
s != "hi" && s != "bye"		

3. [8pts] Write a chunk of code that would read input of the following form

   cost = $32.75

   and prints out cost in dollars and cents, like

   32 dollars and 75 cents

   Note: don't worry about dollars or cents being zero.

4. [4pts] Consider the following chunks of code and for each of the possible "tmp.txt" files given below, write what the program chunk's output would be.

```
double x, prod = 1.0;
char c = '*';
ifstream fin("tmp.txt");
while(fin >> x >> c && c != ';')
{
  prod = prod * x;
}
cout << prod << endl;
```

tmp.txt	tmp.txt
2.0, 3.0, 0.5, 3.0;	2.0, 3.0, 0.5, 3.0,
output	output

```
double x, prod = 1.0;
char c = '*';
ifstream fin("tmp.txt");
while(c != ';' && fin >> x >> c)
{
  prod = prod * x;
}
cout << prod << endl;
```

tmp.txt	tmp.txt
2.0, 3.0, 0.5, 3.0;	2.0, 3.0, 0.5, 3.0,
output	output

5. [6pts] Give the output of the following program chunk for each of the inputs below:

```
int x, y;
while(cin >> x >> y)
  cout << x - y << " ";
cout << "done" << endl;
```

User types: **4 3 2 1 x**	User types: **4 3 2 x**	User types: **x 4 3 x**
output is ...	output is ...	output is ...

6. [10pts] Write a chunk of code that is equivalent to the code below, except that a while loop is used instead of a for loop.

```
int N;
cin >> N;
for(int i = 0; i < N; i++)
{
  if (N % 5 == 0)
    cout << endl;
  cout << '*';
}
cout << endl;
```

7. [8pts] fill in the condition in the if statement to the right so that it is equivalent to the code below:

```
if (x < 0)
{
   if (x > -5)
     cout << "charge";
   else
     cout << "retreat";
}
else
{
  if (x < 5)
    cout << "retreat";
  else
    cout << "charge";
}
```

```
if (                                   )
  cout << "charge:";
else
  cout << "retreat";
```

8. [10pts] Give the type for each of the expressions identified below.

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

int main()
{
  ifstream fin("tmp.txt");
          a
         /^\
  if ( ! fin )
  {    \___/
         b
    cout >> "Error!" >> endl;
    return 1;
  }

  int x, y, xold = 0, yold = 0, count = 0;
  while(fin >> x >> y)
  {
    int dx = xold - x;
    int dy = yold - y;
    if (dx != 0 && count != 0)
    {   \___________________/
                c

      cout >> dy / double(dx) >> endl
      \__/    \_____________/
    }  d             e
    count++;
  }
  return 0;
}
```

a. _____

b. _____

c. _____

d. _____

e. _____

9. [8pts] For each of the expressions below, add parentheses to show how the expression will be evaluated, and circle "precedence" or "associativity" to indicate which of the two determines the parenthesization.

a. x - y % z precedence associativity

b. x = y = z precedence associativity

c. x < y < z precedence associativity

d. x == y + 1 precedence associativity

10. [6pts] The following program is supposed to print out the sum of all the numbers in a file whose name is given by the user. It has two errors.

    1. Locate the errors and annotate the code to show how to fix them.
    2. For each error, indicate whether this is a compile time error or a run-time error.

```
string filename;
int next = 0, total = 0;
cin >> filename;
ifstream fin(filename);

while(fin >> next)
{
  total + next = total;
}

cout << total << endl;
```

11. [10pts] Consider the code below:

```
 1 #include <iostream>
 2 #include <fstream>
 3 using namespace std;
 4
 5 int main()
 6 {
 7   ifstream fin("tmp.txt");
 8   if (!fin)
 9   {
10     cout << "Error!" << endl;
11     return 0;
12   }
13   else
14   {
15     double x, y, res;
16     cin >> x >> y;
17     res = sqrt(x^2 + y^2) << endl;
18   }
19   cout << "distance = " << res << endl;
20   return 0;
21 }
```

When I try to compile this code, I get the following error messages:

```
p2.cpp: In function 'int main()':
p2.cpp:17:22: error: invalid operands of types 'double' and 'double' to binary 'operator^'
p2.cpp:17:25: error: 'sqrt' was not declared in this scope
p2.cpp:19:28: error: 'res' was not declared in this scope
```

Annotate the code to show how to fix these errors. When you're done, you should have a program that correctly reads in two numbers from file tmp.txt and computes the distance of the point they define from (0,0) ... which is what this code was trying to do.