Name: *(as it would appear on official course roster)*	Yuandong Fei
Umail address:	yfei @umail.ucsb.edu
Optional: name you wish to be called if different from name above.	
Optional: name of "homework buddy" (leaving this blank signifies "I worked alone"	

section: T R 6:30 PM

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h03: Chapter 3: Boolean expressions, multiway branches, more loops

h03

CS16 W19

ready?	assigned	due	points
true	Thu 01/24 09:00AM	Mon 01/28 11:00PM	100

Submit your homework as a pdf file through Gradescope before the due date listed above. There is NO MAKEUP for missed assignments; in place of that, we drop the lowest scores (if you have zeros, those are the lowest scores.)
For best results, **save this page as a pdf**, then print the pdf. Please write all your answers in the provided space. Homework submitted in a format different from the provided template will receive 0 points. Please mark your homework clearly, regardless of if you write it out digitally, or in ink or pencil!

Please turn in the PDF copy of your homework on Gradescope. There are several posts on Piazza with helpful links for how to "write" on the PDF.

Read Ch 3.1 - 3.3, pages 112-118, 120-154.

1. (12 pts) Precedence rules determine how the compiler groups operators and operands when evaluating an expression in the absence of paranthesis. For each of the following expressions add parentheses to show how the expression is evaluated according to the C++ precedence rules. See the first line for an example.

```
    x + 2 || !y - 3    ->   (x + 2) || ((-y) - 3)

a) x == 2 || y > 20          (x == 2) || (y>20)

b) !y && x < 9 * 2 || y < x          ((!y) && (x < (9 * 2 )) )|| (y < x)

c) x + 7 > 10 || x + 23 < -7       ((x +7) > 10) || ((x+23) < -7)
```

2. (10 pts) Show the output of the following code AND also write the final value of x after the code is executed.

```
int x = 17;
while ( x > 0) {
   cout << x << endl;
   x = x - 5;
 }
```

output: 17
12
7
2

x = -3

3. (10 pts) What is the outcome of the following code?

```
int x = 0;
while ( x = 2 && x <10) {
   cout << x << endl;
   x+=2;
 }
```

infinite 1

5. (18 pts) What is the result (i.e. TRUE or FALSE) of the following Boolean expressions in C++, given that: x = 2, y = -1, z = 0 in each case. Write T or F in the provided space.

F
T
T
F
T
F

```
a) ____ (x == 6)

b) ____ !(y > 0)

c) ____ ((x == 2) || (y > 20))

d) ____ ((x >= 3) && (z <= 12))

e) ____ ((x > y) && (y < z))

f) ____ ((!(x < z) || (y > z)) && (z == 12) && (y == 10))
```

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6. (30 pts) Using plain and/or multiway if-else statements ONLY write a program (just the main function, no header files) that outputs the grade of a student given an integer variable 'score'. The program should read the student's score as a argument passed to main(). If the score is outside the range of 0 and 100, the program should output "Not a valid score" and exit. Otherwise, it should output the string "Grade is X" where X is replaced by the student's letter grade according to the following rubric:

```
90 <= score <=100, grade = 'A'| 80 <= score < 90 , grade = 'B'| 70 <= score < 80 , grade = 'C'|
60 <= score < 70 , grade = 'D' | 0 <= score < 60 , grade = 'F'
```

…..a) Make your program easy to read and understand. Format your answers so that they are readable on the display. This means consider your use of "\n" characters.

…..b) Test this program out by compiling it and running it the same way you do with lab assignments. Write the code for a functionally correct program below.

a.

```
int main( int argc, char*argv[ ])
{
   if(argc == 1)
   {
       return 0;
   }
   else
   {
      int score = atoi(argv[1]);
      if(score < 0 || score > 100)
      {
          cout<<"Not a valid score"<<endl;
          return 0;
      }
      else if (score >= 90)
      {
          cout<<"Grade is A" << endl;
      }
      else if (score >= 80)
      {
          cout<<"Grade is B" << endl;
      }
      else if (score >= 70)
      {
          cout<<"Grade is C" << endl;
      }
      else if (score >= 60)
      {
          cout<<"Grade is D" << endl;
      }
      else
      {
          cout<<"Grade is F" << endl;
       }
      return 0;
   }
}
```

7. (10 pts) What is the output of the following statements?

```
int p = 5;
while (--p > 0)
     cout << p << " ";
```

4 3 2 1

8. (10 pts) What is the output of the following statements?

```
int s = 1;
do
     cout << s << " ";
while (s++ <= 5);
```

1 2 3 4 5 6