

10 pts

I The program shown below has many compilation errors. Rewrite the entire program, line by line, next to the original. If you need any additional statements to fix the compilation errors, be sure to include them (you can put in extra lines on the right). Fix all of the compilation errors but:

DO NOT CHANGE THINGS THAT ARE ALREADY LEGAL IN C++.

The final program that you write should compile without errors, but it does not have to make sense.

You must rewrite each line on the right--DO NOT OMIT any lines.

#include <istream>	_____
use namespace std;	_____
int main	_____
{	_____
int n=9, j=2, sum;	_____
cout >> "enter a value ";	_____
v >> cin;	_____
for (j < n)	_____
n + v = j;	_____
if n - 5 >= j	_____
v = j - 3;	_____
else	_____
n = 7j;	_____
sum++;	_____
return 0;	_____

9 pts

II Evaluate each of the following according to the C++ precedence rules.
In each case, show what value is stored in the variable on the left-hand side.

SHOW YOUR WORK SO IT IS CLEAR WHICH OPERATION IS DONE FIRST, THEN SECOND, ETC., UNTIL THE FINAL ANSWER.

DON'T SKIP STEPS.

Use these declarations and initial values for all parts:

```
int    x = 1,    a = 5,    z = 2,    b = 3;
```

```
double w = 4.3;
```

(i) `w = -a - a / 2.0 * b + 1;` `w =`

(ii) `x = a % b / 4 - z * b - 1;` `x =`

(iii) `x = 12 + abs(z - b) - a * 2;` `x =`

9 pts

III Show exactly what will be printed by the program shown below. The person running the program intends to type in the numbers from 1 to 10, one at a time, in order. However, the program may stop before all of these values are typed in.

```
#include <iostream>
using namespace std;
int main()
{
    int e = 3, f = 5;

    cout << "first: " << e
         << " " << f << endl;

    while (e <= 4) {
        e = f + 1;
        f = e + 2;
        if (e <= 5)
            f = f + 10;
        else
            e = e - 2;
        cout << "second: " << e
             << " " << f << endl;
        cout << "enter the next 2 values" << endl;
        cin >> e;
        cin >> f;
        cout << "third: " << e
             << " " << f << endl;
    }

    cout << "fourth: " << e
         << " " << f << endl;
    return 0;
}
```

7 pts

IV Show what is printed by this program.

```
#include <iostream>
using namespace std;
int main()
{
    int p = 10, r = 6, s = 2;

    for (p = 3; p < 8; p = p + 2) {
        s++;
        r = s + 100 * p;
        cout << "inside: " << p << " "
             << r << endl << s << endl;
    }
    cout << "outside";
    return 0;
}
```

9 pts

v In each case below, the two pieces of code look similar. There may or may not be a difference in what they mean.

In each case, first say if the two parts act in the same way. If they do act in the same way, explain why. If they do not act in the same way, give an explanation of the difference in what the two pieces mean when used in a program.

Answer each part in one or more sentences.

Here is an example: What is the difference between

`for (j=1; j<5; j++)` and `for (j=1; j<=4; j++)`

The type of answer I want is something like this:

They act the same. The loop on the left will be executed 4 times (for the following values of j: 1, 2, 3, and 4), and the loop on the right will also be executed the same 4 times.

(a) What is the difference, if any, between

<code>for (i=1; i<4; i++){</code>	and	<code>for (i=1; i<4; i++){</code>
<code>x++;</code>		<code>x++;</code>
<code>}</code>		<code>y++;</code>
<code>y++;</code>		<code>}</code>

(b) What is the difference, if any, between

<code>if (p < q)</code>	and	<code>if (p < q)</code>
<code>cout << "case 1";</code>		<code>cout << "case 1";</code>
<code>else</code>		<code>if (p > q)</code>
<code>cout << "case 2";</code>		<code>cout << "case 2";</code>

(c) What is the difference, if any, between

<code>if (h > k)</code>	and	<code>if (h <= k)</code>
<code>cout << "case 3";</code>		<code>cout << "case 4";</code>
<code>else</code>		<code>if (h > k)</code>
<code>cout << "case 4";</code>		<code>cout << "case 3";</code>

10 pts

VI a. Include a good comment when you write the following function:

Write a function named **printthem()** which will receive two integer parameters, called a and b. The function will return a value (see below).

If a is less than or equal to b, the function will print all of the values from a to b (including the end points).

For example, if a is 4 and b is 7, the function will print the following values: 4 5 6 7.

However, if a is greater than b, (for example, if a is 14 and b is 7), the function will say it is impossible to print in this case.

The function will return the number of values that were printed.

For example, if a is 4 and b is 7, the function will return 4, since 4 values were printed. If a is 14 and b is 7, the function will return 0, since 0 values were printed.

b. Show how to call the function from a main program. When the main program calls the function, main sends as parameters the values of two variables called p and q. The main program will store the value returned by the function in a variable called r.

You must give three things from the main program:

- (1) the declaration for all variables used in the call to the function **printthem()**,
- (2) the call to the function, and (3) the function prototype.

DO NOT GIVE ANY OTHER PARTS OF THE MAIN PROGRAM

9 pts

vii Show what is printed by this program.

```
#include <iostream>
using namespace std;
int funny(int p, int q);
int main()
{
    int a = 2, b = 6, c = 4;

    a = funny(b,c);
    cout << "in main: " << a << " "
         << b << " " << c << endl;
    b = funny(c-1,5) + 10;
    cout << "in main again: " << b
         << " " << c << endl;
    cout << "over";
    return 0;
}

int funny(int p, int q)
{
    int r;

    r = p + q;
    if (r == 8)
        r = r + 3;
    else
        r = r - 5;
    cout << "in the func: " << p << " "
         << q << " " << r << endl;
    return r + 7;
}
```

10 pts

VIII For each of the following, fill in the word or sentence required.
Be sure to give a sentence if that is requested.

1. In a machine language program, the only symbols that can be used are

2. The memory of a computer can be measured in units of M, G, and K.
Arrange these three units, in order, from smallest to largest.

smallest: _____ largest (fill in the letters M, G, K)

3. In a personal computer, _____ is usually performed using the keyboard.

4. In one sentence, what was a major contribution of Herman Hollerith to the history of computing?

5. In one sentence, give one advantage of using transistors over using vacuum tubes.
Your answer must mention both transistors and vacuum tubes.

6. Arrange the following programming languages in order, from oldest to newest:

a. C++ b. Fortran c. C

oldest: _____ newest (fill in the letters a-c)

7. By comparison to 30 years ago, personal computers today are:

- a) more expensive and less powerful
- b) more expensive and more powerful
- c) cheaper and less powerful
- d) cheaper and more powerful

answer: _____

8-9. The three types of errors in a program are called compilation errors,

_____, and _____.

27 pts

ix Write a complete C++ program, including comments (worth 2 pts--be sure to include a good comment at the top and at least one more good comment later in the program), to do the following:

1. Read in the id number of a trip offered by a travel company, the number of miles traveled, and the cost of each mile. Include prompts. Print the original data right after you read it in.

A typical set of values could be: 1234 15 22.67
This means trip 1234 is 15 miles, at a cost per mile of 22.67.

2. Compute the base price for the trip. This is simply the number of miles times the cost of each mile. Print the base price.

3. The travel company gives a discount of 8.52 if the number of miles is 20 or more. For each trip, determine if the trip gets the discount. Print an appropriate message in each case (whether or not the trip gets the discount).

4. Determine the trip's final price. If the trip gets the discount, the final price is the base price for the trip minus the discount. If the trip does not get the discount, the final price is the base price.

Print the final price and the discount. You should print 0 for the discount if there is no discount on this trip.

5. Compute the handling cost. If the final price is below 150, the handling cost is 6.99. If the final price is 150 or above, the handling cost is 2.37. Add the handling cost on to the final price to get the amount charged. Print the handling cost and the amount charged.

6. Repeat the entire series of calculations for the next trip, and the next, until all of the trips have been processed. You must decide how to tell when all of the trips have been processed. Make sure that this method is described in a comment.

7. At the end, print the total number of trips.
Also, print how many of the trips did not receive the discount.

Suggestion: You will need two separate counters.