



Closed book/notes. Show all of your work clearly in the space provided or on the additional page at the end of the exam. If the additional page is used, be sure to clearly label the content for each problem. Be sure to *read each problem carefully*. You should answer all 5 questions. Note: The exam is double-sided.

1. (10 points) Explain what the `#include` directive does.

2. (10 points) List three other ways (using other operators) to write the following line of code:
`x = x + 1;`



3. (20 points) Rewrite the following code segment using a `for` loop instead of a `while` loop.

```
int i = 500;
2 while(i>20) {
    cout << i << " is a number" << endl;
4   ++i;
}
```

4. (30 points) Write a program that will ask the user to enter a positive integer and display one of the following two messages:

The number is prime.

or

The number is not prime.

The first message should be displayed if the number entered is prime, otherwise the second message should be displayed. Note: an integer, x is prime if there is no integer, other than 1 and x , that divides evenly into x .

Your answer should include everything necessary to compile the program. However, due to time limitations, you do *not* need to comment your code.

5. (30 points) Consider the following C++ program:

```
#include <string>
2 #include <iostream>
using std::string;
4 using std::cout;

6
int main()
8 {
    string phrase1 = "Amy is now done.";
10    string phrase2 = "her toothpaste is green, red, and white";
    string phrase3 = "While fishing, Tom fell asleep";
12    string phrase4 = phrase1.substr(7,2) + "w" + phrase2;
    phrase4[7] = 'e';
14    string phrase5 = phrase4.substr(0,9);
    phrase5[2] = ' ';
16    phrase5[3] = 'w';

18    cout << phrase3[0] << phrase3[1] << phrase1.substr(2,8);
    cout << phrase5.substr(4,5) << phrase5 << "and not " + phrase4.substr(0,8)
20        << '?';

22    return 0;
}
```

What would you expect the output of this program to be? For partial credit, show your work.



Additional work area for any problem. Clearly identify to which problem the work on this page is related.



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