541 Final Exam
May 13, 05 - 200 pts

You are allowed four handwritten, 8.5 by 11 crib sheets. Put your name on the crib sheets. Turn in with your exam.

1. (20 pts) From the following problem description, identify the important conditions. Build a test matrix. Be sure to consider obvious error conditions. Create test cases including input values and expected output. Identify the boundaries that should be tested but do not create test cases for those boundaries.

A store has a system to determine the total cost of an order. The inputs for the system are the wholesale price, \( P \), the quantity, \( Q \) and the location, \( L \). The system must determine the retail price. First, if the wholesale price is less than or equal to $20.00, the retail price is set to twice the wholesale price. Otherwise, the markup is 50%. Secondly, if the location is Riley county than a sales tax of 6% is added to the total, otherwise, a sales tax of 5% is added. Lastly, a value of $99 is returned if either the wholesale price or the quantity is less than or equal to zero.
2. (30 pts) Given the following code, draw the CFG and generate a **minimal** set of test cases for each of the following criteria: C0, C1, dpu and dcu criteria. Show your work. Indicate “NONE” if there is not the necessary use.

```cpp
int x, y;
cin >> x >> y;
cout << 'A'; // node A
if (x < 8) {
    y = 2 * x;
cout << 'B'; // node B
    if (y > 8) {
        y = 12;
cout << 'C'; // node C
        if (x > y) {
            cout << 'D'; // node D
            x = 20;
        } else {
            cout << 'E'; // node E
            cout << y << x;
        }
    } else {
        cout << 'F'; // node F
    }
} cout << 'G' << 3 * x; // node G
```

**C0:**
ABCEFGH \((x, 8)\)  
No way to execute ABCEFGH because x has to be less than 8 to get to B, but y is set to 12 in node C so x can't be greater than 8.

**C1:**
ABCEFGH \((5, 10)\)

**DCU:**
Equivalent to C1  
ABG
BC
CEFG

**DPU:**
Equivalent to C1  
A
BC
CEFGH
5. (20 pts) Error one occurred after 14 days, error 2 occurred 16 days later and the third error after another 20 days. Plot the error rate vs error number graph and the error rate vs time graph, label the axes, and estimate the number of errors left in the system and the estimated additional time required to remove all the remaining errors. Also calculate the errors left using the method of area-under-the-line.

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\frac{1}{14}, \frac{1}{16}, \frac{1}{20}
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.071, .063, .05
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