ECE 573
Problem Set 7: CFGs and loop optimizations

Consider the following code:

```
    1: a = b * 2;
L1: 2: if (a >= c) goto L4;
    3: d = 3*a + 4;
    4:  if (d <= c) goto L2;
    5:  x = 2 * c;
    6:  y = 7;
    7:  goto L3;
L2: 8:  y = 3 * c;
L3: 9:  a = a + 2;
   10:  goto L1;
L4:11:
```

1. What are the basic blocks for this code?

2. Draw the basic-block level CFG for this code.

3. What are the loop headers? What are the back edges?

4. What are the loop-invariant instructions in this code?

5. Which instructions could be moved out of the loops?

6. What are the induction variables for the loops in the program? The mutual induction variables?

7. What does this code look like after applying strength reduction?

8. What does this code look like after applying linear test replacement?