ECE 468
Problem Set 7: Loop optimizations

Consider the following code:

```
    1: READ(x);
    2: READ(y);
    3: READ(b);
L1  4: if (x > 100) goto L4
    5:   b = y + 7;
    6    z = y + 2;
    7:   x = x + z;
    8:   goto L1;
L4  9: WRITE(b)
   10: WRITE(x)
   11: halt
```

1. Which line(s) are loop invariant? Explain.
2. Which line(s) can be moved outside of the loop? Explain.

Consider the following code:

```
    1: READ(x);
    2: READ(y);
    3: READ(z);
L1  4:   w = y * x + 5;
    5:   WRITE(w);
    6:   x = x + z;
    7: if (x < 200) goto L1
    8: halt;
```

1. What are the induction variable(s)? What are the mutual induction variable(s)?
2. Perform strength reduction on any mutual induction variables.
3. Perform linear test replacement if possible.