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.