

For the following problems, consider the following code once it reaches steady-state:

```
1 do {
2   for (int i = 0; i < 4; i++) {
3     // increment something
4   }
5   for (int j = 0; j < 8; j++) {
6     // increment something
7   }
8   k++;
9 } while (k < 1000000000)
```

1. **Static Branch Prediction** (1 point each)

- (a) What is the branch prediction accuracy for an always not-taken (PC+4 prediction) branch predictor?

- (b) What is the branch prediction accuracy for an always taken branch predictor?

2. **Dynamic Branch Prediction** (2 points each)

- (a) What is the branch prediction accuracy for a 1-bit branch predictor?

- (b) What is the branch prediction accuracy for a 2-bit branch predictor?

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3. Global vs. Local Branch Prediction (3 points each)

Assume that the PHT contains 2-bit counters.

(a) What is the branch prediction accuracy for a global branch predictor with a 5-bit history?

	test	value	GR	result
1	i<4	i=0		
2	i<4	i=1		
3	i<4	i=2		
4	i<4	i=3		
5	i<4	i=4		
6	j<8	j=0		
7	j<8	j=1		
8	j<8	j=2		
9	j<8	j=3		
10	j<8	j=4		
11	j<8	j=5		
12	j<8	j=6		
13	j<8	j=7		
14	j<8	j=8		
15	k<1000000000	k=?		

(b) What is the branch prediction accuracy for a local branch predictor with a 5-bit history?