

### CSE 141 Summer 2020 Assignment 3

PID: \_\_\_\_\_ Name: \_\_\_\_\_

1. Consider the following C code:

```
int i = 0, sum_remainder_0 = 0, sum_remainder_1 = 0,
sum_remainder_2 = 0;
do {
    if(i % 3 == 0) // Branch X: taken if i % 3 != 0
        sum_remainder_0 += A[i];
    else
    {
        if(i%3 == 1) // Branch Y: taken if i % 3 != 1
            sum_remainder_1 += A[i];
        else
            sum_remainder_2 += A[i];
    }
    i ++;
} while (i < 10000); // Branch Z: taken if i < 10000
```

Please answer the following questions:

- A. If your processor uses a "always-taken" predictor, what's the branch prediction accuracy?

- B. If your processor uses a “local 2-bit” predictor with unlimited BTB entries, what’s the branch prediction accuracy? Assume all counters are initialized as 0s.

- C. If your processor uses a “global 2-bit” predictor with 4-bit GHR and unlimited BTB entries, what’s the branch prediction accuracy? Assume all counters are initialized as 0s.

D. What's the speedup of C. over B.?