Question 2

(a) **BTBMissPct = (1 - (BTBHits/BTBLookups)) ×100**
where: BTBHits -> total number of BTB Hits
BTBLookups -> total number of BTB references

(b) **BranchMispredPercent = (numBranchMispred ÷ numBranches) ×100**
where: numBranchMispred -> total number of mispredicted Branches
numBranches -> total number of branches fetched

We need to add the above two variables in the stats file.

For adding BTBMissPct

Steps

1. Go the file $gem5/src/cpu/pred/bpred unit.hh
2. Add the line in following line in the private section where all Stats:: are mentioned

```
    Stats::Formula BTBMissPct;
```

3. Go to the file $gem5/src/cpu/pred/bpred unit.cc
4. Add the following line in the function void BPredUnit::regStats()

```
    BTBMissPct
        .name(name() + ".BTBMissPct")
        .desc("BTB Miss Percentage")
        .precision(6);
    BTBMissPct = (1-(BTBHits / BTBLookups)) * 100;
```

For adding BranchMispredPercent

Steps

1. Go the file gem5/src/cpu/simple/exec context.hh
2. Add the line in following line in the public section where all Stats:: are mentioned

```
    Stats::Formula numBranchMispredPercent;
```

3. Go to the file gem5/src/cpu/simple/base.cc
4. Add the following lines in the function void BaseSimpleCPU::regStats()

```
    t_info.numBranchMispredPercent =
(t_info.numBranchMispred/t_info.numBranches)*100;

        t_info.numBranchMispredPercent
            .name(thread_str + ".BranchMispredPercent")
            .desc("Number of branch mispredictions percentage")
            .prereq(t_info.numBranchMispred);
```

Save all the files.

Now run the following command in the gem5 installation directory.

`bash`

```
    scons build/X86/gem5.opt -j5
```

Now run the hello program to generate the status.txt in the md5out folder using the following command.

```
./build/X86/gem5.opt ./configs/example/se.py -c
./tests/test-progs/hello/bin/x86/linux/hello --cpu-type=TimingSimpleCPU
```