1. Consider the following outcome sequence of the branch instruction in the given program.
   T, T, T, T, NT, T, T, T, NT, T,NT, NT, T,NT
   What is the percentage of miss-prediction with respect to 1 bit and 2 bit predictor.
   Assume initial state as Taken(1-bit) and Strongly Taken(2-bit).
   (Note: T- Taken NT- NotTaken)

2. Which pipeline stage name was poorly chosen? What would you suggest?

3. Consider the following four RISC machine code fragments each containing two instructions:

i. addi r1 , r1, #4
   load r2, 7(r1)
ii. add r3 , r1, r2
   store r2, 7(r1)
iii. breq r1, place
   store r1, 7(r1)
iv. store r3, 17(r10)
   load r2, 12(r8)

(a) For each code fragment (i) to (iv) identify each dependence and hazards.
(b) For each code fragment, indicate whether data forwarding is sufficient to resolve the dependence or if stall cycles are required. Indicate the number of stall cycles.

4. Consider the following RISC assembly code.

load r1,45(r2) (1)
add r7 ← r1, r5 (2)
sub r8 ← r1, r6 (3)
or r9 ← r5, r1 (4)
brneq r7, target (5)
add r10 ← r8, r5 (6)

(a) Identify each dependence; list the two instructions involved; identify which instruction is dependent; and, if there is one, name the storage location involved (register or memory).
(b) Using the 5-stage pipeline from class, which of the dependences that you found in part (a) become hazards and which do not.

5. Does below sequence of instruction in the 5stage pipeline causes hazard? Justify your answer.

```
ldr     R7, [R2]
ldr     R6, [R2, #4]
add     R4, R5, R6
str     R6, [R2, #4]
```