作业(4)：TLP

Q1-Sol:

    a. Tag-index-offset: [31:14]-[13:3]-[2:0]
    b. Nothing. It has the modified copy.
    c. No. Tags are different, and thus they are different data.
    d. P0: S → M, P1: S → I
    e. Shared. The data is clean and the protocol is MSI.
    f. Exclusive. The data is exclusively clean.

Q2-Sol:
    a. B is 2:
          B = 1; → A = 1; while (A != 1); → B = 2; while (B == 0);
          B = 1; → while (A != 1); → A = 1; → B = 2; → A = 2;
        B is 1:
          B = 1; → A = 1; → A = 2; → while (A != 1); → …
    b. Dead code elimination (A = 1;), causing the while (A != 1) to loop forever.

Q3-Sol:
    a. 1) designing heterogeneous coherence protocols is difficult; 2) reasoning about the memory consistency model provided by the heterogeneous processor.
    b. a compositional amalgamation of each of the per-cluster consistency models where operations from each cluster continue to adhere to that cluster's consistency model.
    c. See section VI. Analyze input protocols → writes → reads → concurrency
    d. generate heterogeneous protocols and also validate correctness. 1) Heterogeneous Litmus Testing; 2) Heterogeneous Litmus Testing.
    e. HeteroGen-generated protocols appear to have similar performance and network traffic to a manually-generated heterogeneous protocol. HeteroGen performing similarly to the manually-generated HCC on average. HeteroGen performing similarly to the manually-generated HCC on average. Traffic incurred is within 5% of HCC on average.
    f. N.A.