2015/Spring Computer Architecture PhD Qualifying Exam

Student ID _____________________  Name _____________________

* Answer each question in **10 lines** or you will be given penalty points.

1. Explain a (3,2) two-level predictor using a figure. How can correlations between branch instructions be captured in the predictor? (25 points)

2. Explain the roles of the reorder buffer and reservation stations in the speculative Tomasulo algorithm (25 points).

3. Memory hierarchy (25 points).
   (a) What is no write allocate policy? (8 points)
   (b) Miss penalties of replacing all cache lines in write back caches are the same (true or false) and why? Assume no write buffer is employed (8 points).
   (c) What is a write buffer? (9 points)

4. Multiprocessors
   (a) What are vector lanes in vector processors? (12 points)
   (b) What is the E state in MESI protocol? (13 points)