Problem 1: Solve Fall 2008 Final Exam Problem 4 and the additional questions below.

(a) For part (a) provide pipeline execution diagrams for the three systems (5-stage scalar, n-way superscalar, and 5n-stage superpipelined) running code of your choosing. Refer to these diagrams when answering part (a).

Problem 2: Consider the three systems from Problem 4 in the final exam. The problem focused on potential (favorable) execution time, which can be achieved when there are few stalls, here we’ll be more realistic.

(a) Which system will suffer more stalls on typical code? Explain.

(b) Invent a quantitative measure of implementation (not program) stall potential and apply it to the three systems. The answer should include a formula for each system (giving the stall potential); the superscalar and superpipelined formulas should be in terms of n. Hint: think about the average or minimum distance between two dependent instructions needed to avoid a stall. The formulas should be consistent with your answer to the first part.