CSE340: Computer Architecture

Chapter 4 Practice Problems

1. **Draw** the datapath for the following instruction. You must mention the control bits, ALU control bits, and the select bits for the MUX.

   ```
   sw $7, 16($11)
   ```

2. **Draw** the datapath for the following instruction. You must mention the control bits, ALU control bits, and the select bits for the MUX.

   ```
   beq $7, $11, Else
   ```

3. **Sketch** single cycle datapaths for the below instructions. Make sure that all the data and control links are properly labeled.

   ```
           i) Add $10,$11,$12
           ii) Lw $5,40($6)
   ```

4. Consider the following set of instructions being executed in the Von Neumann architecture. Solve the hazard using stalls only. Draw the **diagram** for pipelining as well as calculate the CPI.

   ```
   sw $8, 20($10)
   lw $8, 24($10)
   sw $10, 24($10)
   ori $8, $10, 12
   ```

5. All 5 stages take the same amount of time (300ns) to execute for the following instructions. Solve the data hazard using only stalls. Draw the diagram for pipelining and **calculate** the CPI and the total amount of time to execute this instruction set.

   ```
   andi $15, $14, -7
   sw $15, 24($10)
   lw $15, 24($11)
   or $8, $17, $15
   ```