**Homework 9**

**Computer Architecture**

1. A digital computer has a common bus system for 16 registers of 32 bits each. The bus is constructed with multiplexers.
   1. How many selection inputs are there in each multiplexer?
   2. What size of multiplexers are needed?
   3. How many multiplexers are there in the bus?
2. The adder-subtractor circuit has the following values for input mode M and data inputs A and B. In each case, determine the values of the output: S3, S2, S1, S0, and C4.

|  |  |  |  |
| --- | --- | --- | --- |
|  | M | A | B |
| a. | 0 | 0111 | 0110 |
| b. | 1 | 1100 | 1000 |

1. Design an arithmetic circuit with one selection variable S and two n-bit data inputs A and B. The circuit generates the following four arithmetic operations in conjunction with the input carry Cin. Draw the logic diagram for the first two stages.

|  |  |  |
| --- | --- | --- |
| S | Cin = 0 | Cin = 1 |
| 0 | D = A + B (add) | D = A + 1 (increment) |
| 1 | D = A – 1 (decrement) | D = A + B' + 1 (subtract) |