Homework 4

1. Unsigned Integers binary representation and arithmetic

Give the 8-bit binary representation of the following numbers:

A = 118

B = 98

C = 46

D = 15

118 = 0111 0110

98 = 0110 0010

46 = 0010 1110

15 = 0000 1111

1. Compute the following problems step by step in binary form:

A – B

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 |
| - | 0 | 1 | 1 | 0 | 0 | 0 | 1 | 0 |
|  | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 |

A – B = 0001 0100

|  |  |  |  |
| --- | --- | --- | --- |
| Step | Action | Multiplicand | Product |
| 0 | Initial | 0010 1110 | 0000 0000 0000 1111 |
| 1 | P: P + M  P >> 1 | 0010 1110 | 0010 1110 0000 1111  0001 0111 0000 0111 |
| 2 | P: P + M  P >> 1 | 0010 1110 | 0100 0101 0000 0111  0010 0010 1000 0011 |
| 3 | P: P + M  P >> 1 | 0010 1110 | 0101 0000 1000 0011  0010 1000 0100 0001 |
| 4 | P: P + M  P >> 1 | 0010 1110 | 0101 0110 0100 0001  0010 1011 0010 0000 |
| 5 | P >> 1 | 0010 1110 | 0001 0101 1001 0000 |
| 6 | P >> 1 | 0010 1110 | 0000 1010 1100 1000 |
| 7 | P >> 1 | 0010 1110 | 0000 0101 0110 0100 |
| 8 | P >> 1 | 0010 1110 | 0000 0010 1011 0010 |

A / D

|  |  |
| --- | --- |
|  | 0111 |
| 1111 | 01110110 |
|  | - 1111 |
|  | 11101 |
|  | - 1111 |
|  | 11100 |
|  | - 1111 |
|  | 1101 <= Remainder |

1. Let the decimal number A = 54, B = -77, give the 8-bit 2’s complement representation of B. Compute A\*B in 2’s complement and provide its decimal representation.