# CS-341 Lecture 19

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# Combinations of ALU Controls

(Table 4-2; page 206)

| F0 | F1 | ENA | ENB | INVA | INC | Description |
|---|---|---|---|---|---|---|
| 0 | 1 | 1 | 0 | 0 | 0 | A |
| 0 | 1 | 0 | 1 | 0 | 0 | B |
| 0 | 1 | 1 | 0 | 1 | 0 | ~A |
| 1 | 0 | 1 | 1 | 0 | 0 | ~B |
| 1 | 1 | 1 | 1 | 0 | 0 | A + B |
| 1 | 1 | 1 | 1 | 0 | 1 | A + B + 1 |
| 1 | 1 | 1 | 0 | 0 | 1 | A + 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | B + 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | B - A |
| 1 | 1 | 0 | 1 | 1 | 0 | B - 1 |
| 1 | 1 | 1 | 0 | 1 | 1 | -A |
| 0 | 0 | 1 | 1 | 0 | 0 | A AND B |
| 0 | 1 | 1 | 1 | 0 | 0 | A OR B |
| 0 | 1 | 0 | 0 | 0 | 0 | 0 |
| 0 | 1 | 0 | 0 | 0 | 1 | 1 |
| 0 | 1 | 0 | 0 | 1 | 0 | -1 |

# Updated Version of Table 4-2

Add and OR are the same when INC is zero.

When doing OR, INC can be X.

There was an error in the line to produce +1.

| F0 | F1 | ENA | ENB | INVA | INC | Description |
|---|---|---|---|---|---|---|
| X | 1 | 1 | 0 | 0 | 0 | A |
| X | 1 | 0 | 1 | 0 | 0 | B |
| X | 1 | 1 | 0 | 1 | 0 | ~A |
| 1 | 0 | 1 | 1 | 0 | 0 | ~B |
| 1 | 1 | 1 | 1 | 0 | 0 | A + B |
| 1 | 1 | 1 | 1 | 0 | 1 | A + B + 1 |
| 1 | 1 | 1 | 0 | 0 | 1 | A + 1 |
| 1 | 1 | 0 | 1 | 0 | 1 | B + 1 |
| 1 | 1 | 1 | 1 | 1 | 1 | B - A |
| 1 | 1 | 0 | 1 | 1 | 0 | B - 1 |
| 1 | 1 | 1 | 0 | 1 | 1 | -A |
| 0 | 0 | 1 | 1 | 0 | 0 | A AND B |
| 0 | 1 | 1 | 1 | 0 | 0 | A OR B |
| X | 1 | 0 | 0 | 0 | 0 | 0 |
| 1 | 1 | 0 | 0 | 0 | 1 | 1 |
| X | 1 | 0 | 0 | 1 | 0 | -1 |

X means “don’t care” (Whether it is zero or one doesn’t affect the result.)