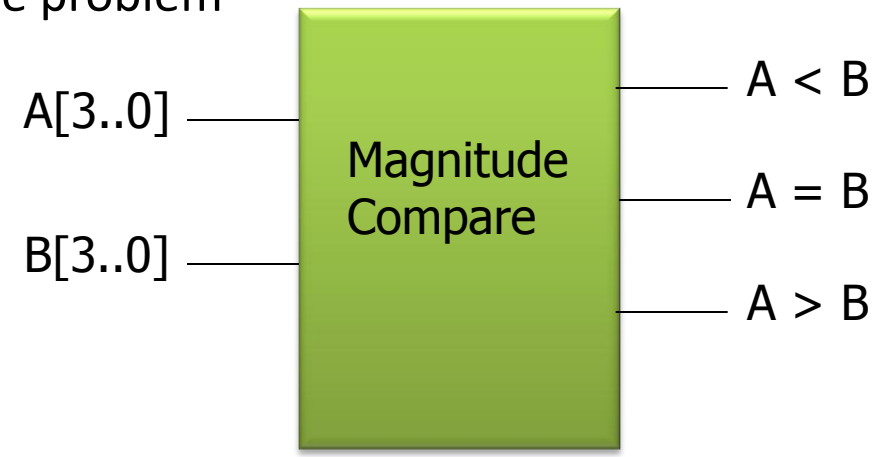
# Magnitude Comparator

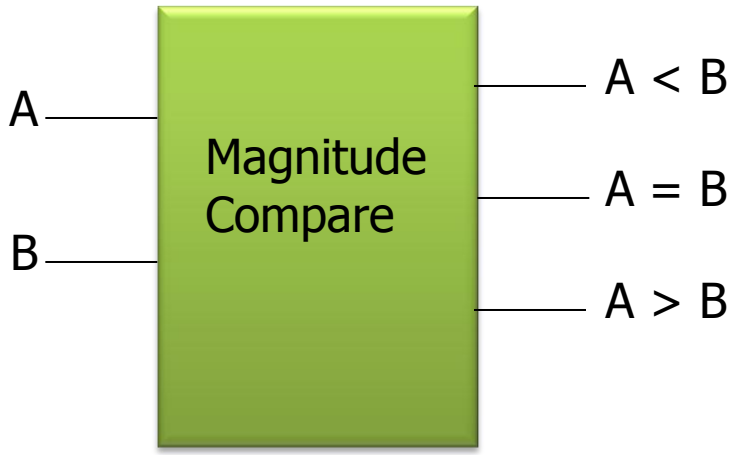
- Comparator compares two binary number.
- The magnitude comparator for comparison of single bit numbers
  - outputs:
    - A>B,
    - A=B,
    - A<B
- $2^{2n}$ entries - too cumbersome for large n

- Use inherent regularity of the problem
  - reduce design efforts
  - reduce human errors



# Single or one bit comparator truth table is as shown

| Input | | | Output | | |
|---|---|---|---|---|---|
| A | B | | A < B | A = B | A > B |
| 0 | 0 | | 0 | 1 | 0 |
| 0 | 1 | | 1 | 0 | 0 |
| 1 | 0 | | 0 | 0 | 1 |
| 1 | 1 | | 0 | 1 | 0 |




Output A < B

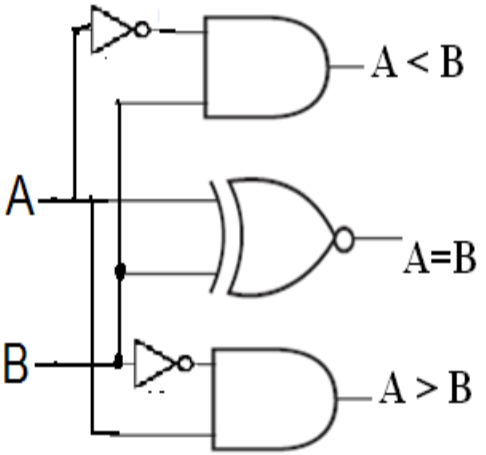
| A \ B | $\bar{B}$ | B |
|---|---|---|
| $\bar{A}$ | 0 | 1 |
| A | 0 | 0 |

Output A = B

| A \ B | $\bar{B}$ | B |
|---|---|---|
| $\bar{A}$ | 1 | 0 |
| A | 0 | 1 |

Output A > B

| A \ B | $\bar{B}$ | B |
|---|---|---|
| $\bar{A}$ | 0 | 0 |
| A | 1 | 0 |



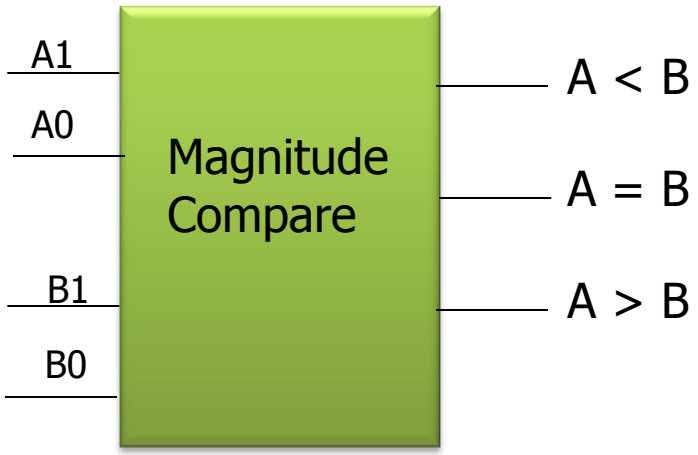

For A < B is

For A = B is

For A > B is

# Single or one bit comparator truth table is as shown

| | Input | | | | | Output | | |
|---|---|---|---|---|---|---|---|---|
| | A1 | A0 | | B1 | B0 | | A < B | A = B | A > B |
| 0 | 0 | 0 | | 0 | 0 | | 0 | 1 | 0 |
| 1 | 0 | 0 | | 0 | 1 | | 0 | 0 | 1 |
| 2 | 0 | 0 | | 1 | 0 | | 0 | 0 | 1 |
| 3 | 0 | 0 | | 1 | 1 | | 0 | 0 | 1 |
| 4 | 0 | 1 | | 0 | 0 | | 1 | 0 | 0 |
| 5 | 0 | 1 | | 0 | 1 | | 0 | 1 | 0 |
| 6 | 0 | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 7 | 0 | 1 | | 1 | `1 | | 0 | 0 | 1 |
| 8 | 1 | 0 | | 0 | 0 | | 1 | 0 | 0 |
| 9 | 1 | 0 | | 0 | 1 | | 1 | 0 | 0 |
| 10 | 1 | 0 | | 1 | 0 | | 0 | 1 | 0 |
| 11 | 1 | 0 | | 1 | 1 | | 0 | 0 | 1 |
| 12 | 1 | 1 | | 0 | 0 | | 1 | 0 | 0 |
| 13 | 1 | 1 | | 0 | 1 | | 1 | 0 | 0 |
| 14 | 1 | 1 | | 1 | 0 | | 1 | 0 | 0 |
| 15 | 1 | 1 | | 1 | 1 | | 1 | 1 | 0 |

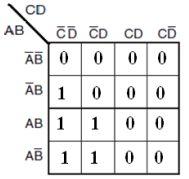


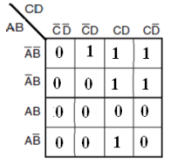
| | Input | | | | | | Output | | |
|---|---|---|---|---|---|---|---|---|---|
| | A1 | A0 | | B1 | B0 | | A < B | A = B | A > B |
| 0 | 0 | 0 | | 0 | 0 | | 0 | 1 | 0 |
| 1 | 0 | 0 | | 0 | 1 | | 0 | 0 | 1 |
| 2 | 0 | 0 | | 1 | 0 | | 0 | 0 | 1 |
| 3 | 0 | 0 | | 1 | 1 | | 0 | 0 | 1 |
| 4 | 0 | 1 | | 0 | 0 | | 1 | 0 | 0 |
| 5 | 0 | 1 | | 0 | 1 | | 0 | 1 | 0 |
| 6 | 0 | 1 | | 1 | 0 | | 0 | 0 | 1 |
| 7 | 0 | 1 | | 1 | `1 | | 0 | 0 | 1 |
| 8 | 1 | 0 | | 0 | 0 | | 1 | 0 | 0 |
| 9 | 1 | 0 | | 0 | 1 | | 1 | 0 | 0 |
| 10 | 1 | 0 | | 1 | 0 | | 0 | 1 | 0 |
| 11 | 1 | 0 | | 1 | 1 | | 0 | 0 | 1 |
| 12 | 1 | 1 | | 0 | 0 | | 1 | 0 | 0 |
| 13 | 1 | 1 | | 0 | 1 | | 1 | 0 | 0 |
| 14 | 1 | 1 | | 1 | 0 | | 1 | 0 | 0 |
| 15 | 1 | 1 | | 1 | 1 | | 1 | 1 | 0 |

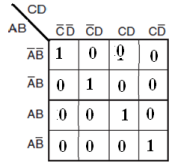
Output A < B

Output A = B

Output A > B




For A > B is

For A = B is

For A < B is

# Drown the Circuit implementation of 2bit magnitude comparator

For A > B =

For A = B =

For A < B =