

### Stability and Determinacy of Trusses

$$b + r = \text{unknown}$$

$$j = \text{equations}$$

- 1-  $b + r < 2j$ , the truss is unstable
- 2-  $b + r = 2j$ , the truss is determinate if stable
- 3-  $b + r > 2j$ , the truss is indeterminate if stable

Let (m) equal to the degree of indeterminate

$$m = (b + r) - 2j$$

b = No. of bars

r = No. of reactions

j = No. of joints

**Examples:** - Find the stability and determinacy of trusses below.

Ex1

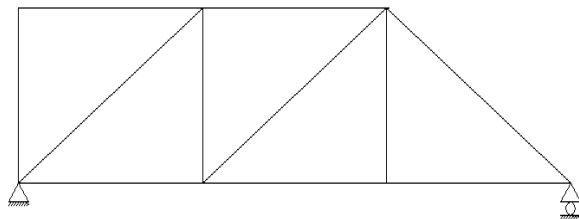
$$r = 3, b = 11, j = 7$$

$$b+r = 14$$

$$2j = 14$$

$$b+r = 2j$$

The truss is stable & determinate



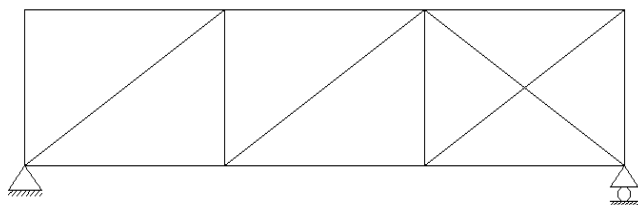
Ex2

$$r = 3, b = 14, j = 8$$

$$b+r = 17$$

$$2j = 16$$

$b+r > 2j$ , the truss is stable & indeterminate 1<sup>st</sup> degree



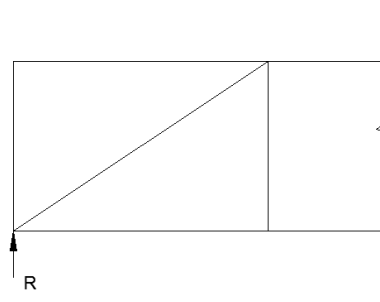
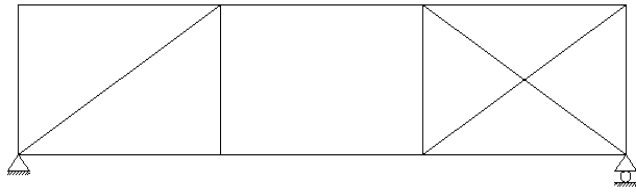
Ex3

$$r = 3$$

$$b = 13$$

$$2j = 16$$

$b+r = 2j$ , the truss is unstable because of  $\sum F_y \neq 0$ , in this section



Ex4

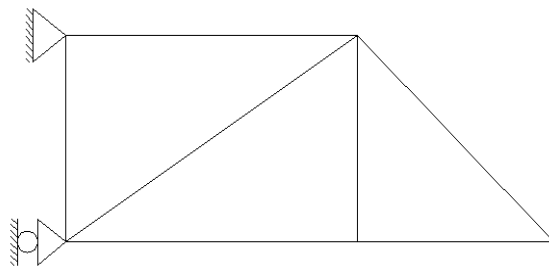
$$r = 3, b = 7, j = 5$$

$$b + r = 10$$

$$2j = 10$$

$$b + r = 2j$$

The truss is stable & determinate



Ex5

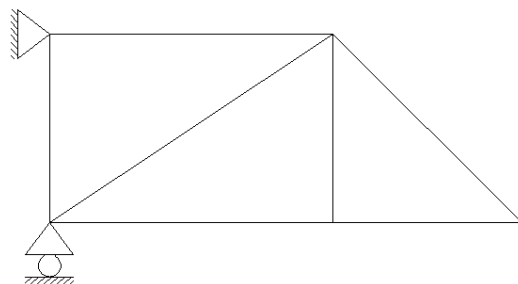
$$r = 3, b = 7, j = 5$$

$$b + r = 10$$

$$2j = 10$$

$$b + r = 2j$$

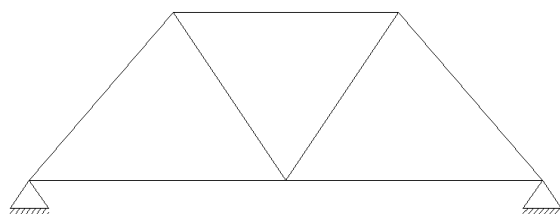
The truss is unstable



Ex6

$$r = 4, b = 7, j = 5$$

$$b + r = 11$$



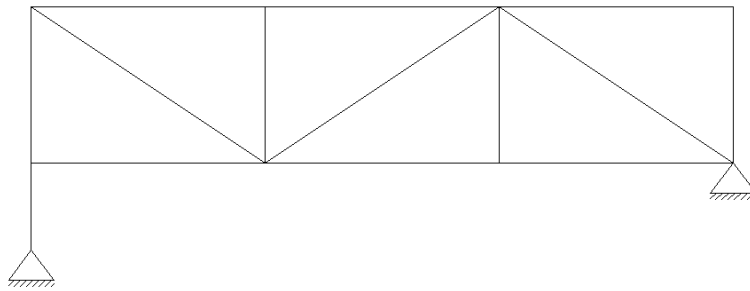
$$2j = 10$$

$$b + r > 2j$$

The truss is stable & indeterminate 1<sup>st</sup> degree

## Home works

H.W1



H.W2

