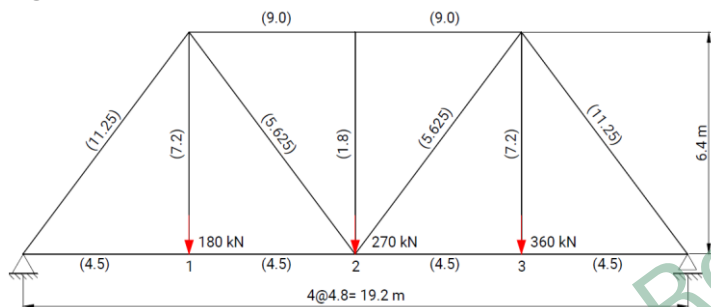# Problem 5

Figure

Description

Consider the truss shown in the figure, which is subjected to vertical loads of 180 kN, 270 kN, and 360 kN at joints L_1, L_2, L_3 respectively. The geometry of the truss, including all member lengths, is indicated in the figure. The cross-sectional areas of the members (given in parentheses) are expressed in units of $10^{-3} m^2$. The modulus of elasticity for all members is E = 200 000 kN/ m^2.

Determine:

- Ax horizontal and vertical deflections of joint L_3 caused by the applied loads.

Model

Units:	m, kN
Element:	Truss element
Material:	Steel, E = 2.0×10^8 kN/m^2
Section property:	A = various
Constraints:	Left node: Ux, Uy restrained; Right node: Uy restrained
Load Case:	Node concentrated load –180 kN, -270 kN and -360 kN are applied at nodes 1, 2 and 3 respectively in the Y direction.

Results
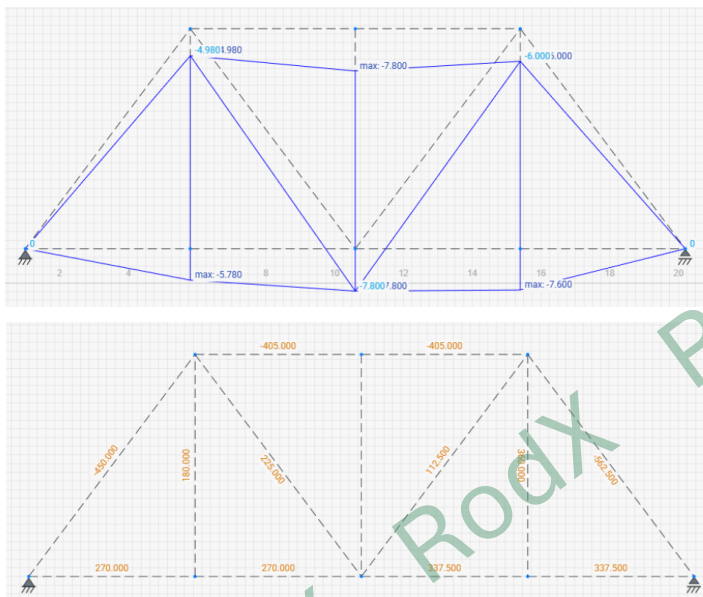
Units:			mm
Node	**Ux**	**Uy**	
4	2.88	-7.80001	
3	4.68001	-7.6	
5	6.48001	0	

Comparison of Results

Node	Deformation, mm		
	Theoretical	**RodX**	**Midas/Civil**
Δx(3)	4.68	4.68	4.68
Δy(3)	-7.60	-7.60	-7.60

Reference

1. C.K. Wang, Intermediate Structural Analysis, 1985, McGraw-Hill, p.80