Verification of Nodal analysis.

Q. Apply Nodal analysis and find out voltages V_1, V_2 and V_3 at nodes.

→ At node 1:-

$$I_1 + I_2 = -8 - 3$$
$$\frac{V_1 - V_3}{3} + \frac{V_1 - V_2}{4} = -11$$

$$\therefore 7V_1 - 3V_3 - 4V_2 = -132 \quad or$$
$$7V_1 - 4V_2 = -132 + 3V_3 \quad —①$$

At node 2:-

$$I_2 = I_3 + I_4 - 3$$
$$\frac{V_1 - V_2}{3} = \frac{-V_2}{1} + \frac{V_2 - V_3}{7} - 3$$
$$\therefore 7V_1 - 31V_2 + 3V_3 = -63 \quad —②$$

At node 3:-

$$I_1 + I_4 = I_5 - 25$$
$$\frac{V_1 - V_3}{4} + \frac{V_2 - V_3}{7} = \frac{V_3}{5} - 25$$

$$\therefore 7V_1 + 4V_2 - 16.6V_3 = -700 \quad —③$$

After solving above 3 equations, we get

$V_1 = 5.414 V,$

$V_2 = 7.737 V,$

$V_3 = 46.316 V$

Which is seems to be correct and can be verified
from below simulation:-