

Problem of the Week One

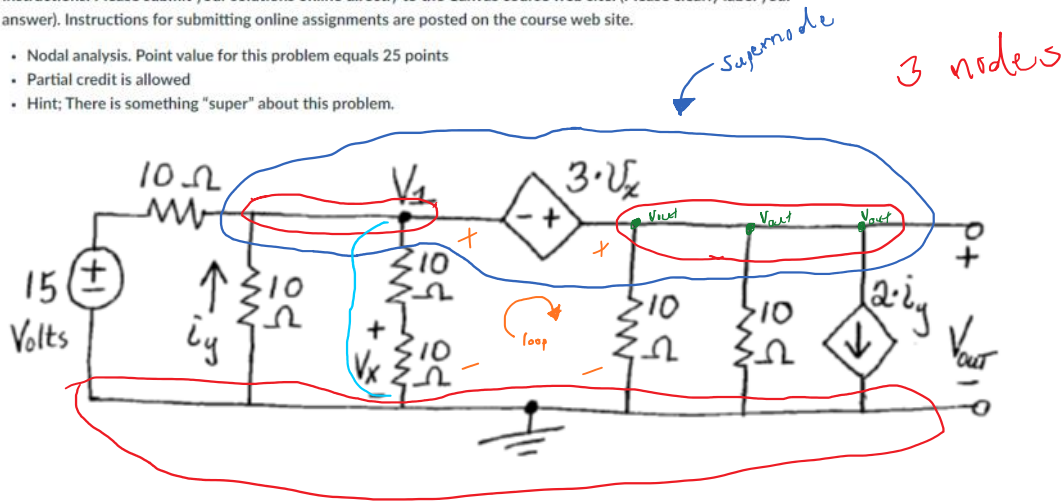
Wednesday, September 30, 2020 1:19 PM

"I pledge my honor I have abided by the Stevens Honor system."

Her Gaskins

Instructions: Please submit your solutions online directly to the Canvas course web site. (Please clearly label your answer). Instructions for submitting online assignments are posted on the course web site.

- Nodal analysis. Point value for this problem equals 25 points
- Partial credit is allowed
- Hint: There is something "super" about this problem.



For Supernode:

$$\frac{V_1 - 15}{10} + \frac{V_1}{10} + \frac{V_1}{20} + \frac{V_{out}}{10} + \frac{V_{out}}{10} + 2i_y = 0$$

$$.1 V_1 + .1 V_1 + .05 V_1 + .1 V_{out} + .1 V_{out} + 2i_y = 1.5$$

$$.25 V_1 + .2 V_{out} + 2i_y = 1.5$$

For i_y :

$$\frac{V_1}{10} = -i_y$$

$$i_y = -.1 V_1$$

For loop:

$$-V_1 - 3V_x + V_{out} = 0$$

Voltage Division:

$$V_x = \frac{10}{10+10} V_1$$

$$V_x = \frac{10}{10+10} V_1$$

$$V_x = .5 V_1$$

Solve for Unknowns:

$$-V_1 - 3(.5 V_1) + V_{out} = 0$$

$$V_{out} = 2.5 V_1$$

$$.25 V_1 + .2 V_{out} + 2i_y = 1.5$$

$$.25 V_1 + .2(2.5 V_1) + 2i_y = 1.5$$

$$.75 V_1 + 2(-.1 V_1) = 1.5$$

$$.55 V_1 = 1.5$$

$$V_1 = 2.72 V$$

$$V_{out} = 2.5 V_1$$

$$V_{out} = 2.5(2.72)$$

$$V_{out} = 6.8 V$$