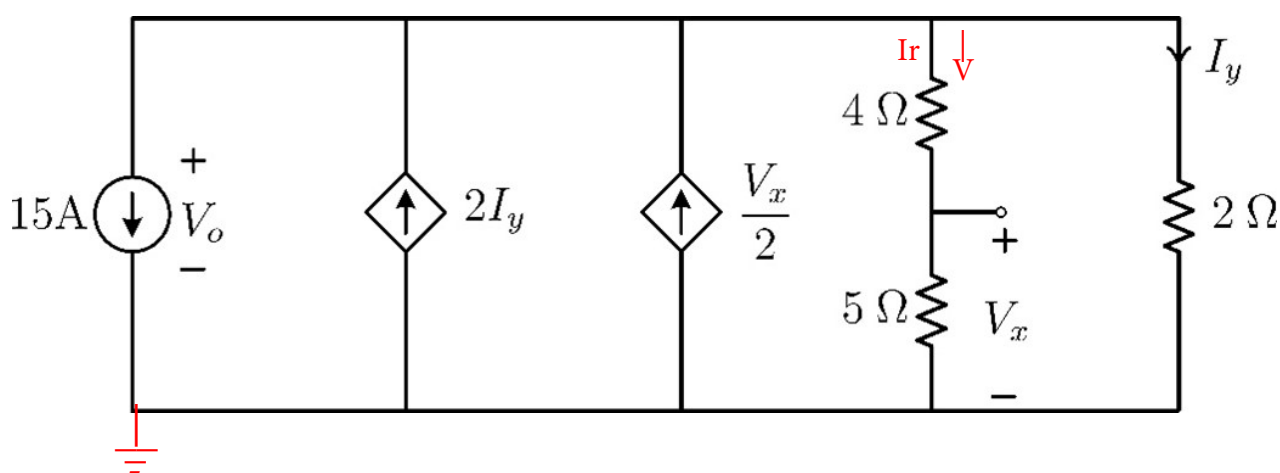# 1.

Find V_o in the circuit below. Use only KCL, KVL, and Ohm's law (you will not get the mark for this question if you use other circuit analysis techniques, such as nodal analysis, mesh analysis, etc.). [5 points for correct answer, 20 points for process work]

$V_o = \boxed{22.50 \pm 3\%}$ V

Vo

KCL @ Vo
set current out as positive

(1) $15 - 2Iy - 0.5Vx + Ir + Iy = 0$

Ohm's Law for Ir , Iy

(2) $Ir = Vo / (4\Omega + 5\Omega)$

(3) $Iy = Vo / (2\Omega)$

Voltage divison for Vx (KCL + Ohm's law)

(4) $Vx = Vo * (5\Omega / (4\Omega + 5\Omega))$

Substitute (2),(3),(4) into (1) and solve

     $15 - 2(Vo/2\Omega) - 0.5(Vo * (5\Omega / (4\Omega + 5\Omega))) + Vo / (4\Omega + 5\Omega) + Vo / (2\Omega) = 0$

     $270 - 18Vo - 5Vo + 2Vo + 9Vo = 0$

Vo = 22.5V