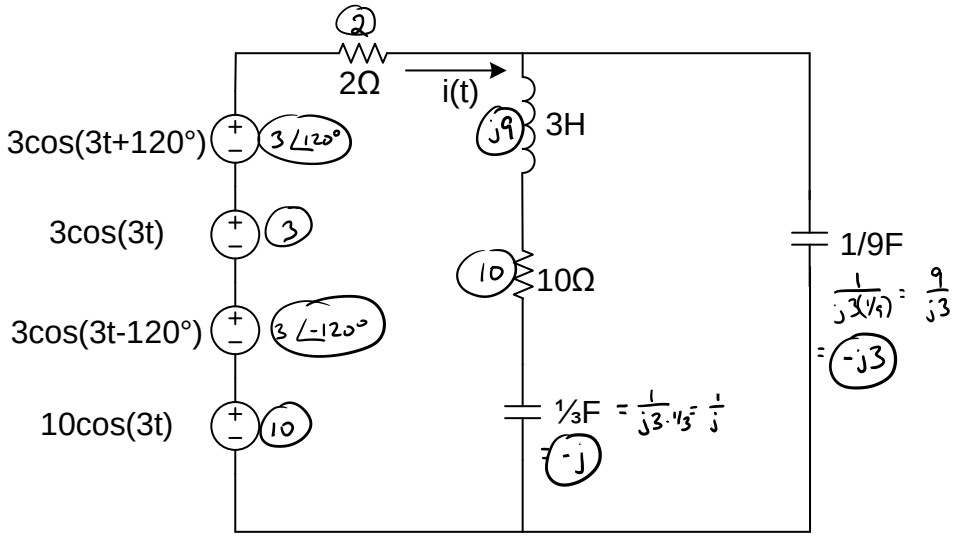
1. Simplify the following circuit to a single voltage source and impedance and solve for i(t).



$V_T = 3\angle 120° + 3 + 3\angle -120° + 10 = 10\angle 0°$

$Z_T = 2 + [(j9 + 10 - j) \,//\, -j3]$

$= 2 + (10 + j8) \,//\, (-j3)$

$= 2 + \dfrac{(-j3)(10 + j8)}{10 + j8 - j3}$

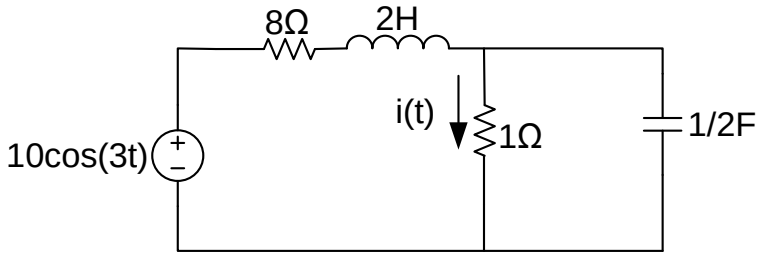
$= 2 + \dfrac{(-j3)(10 + j8)}{10 + j5}$

$= 4.32\angle -51°$

$I = \dfrac{V_T}{Z_T} = \dfrac{10\angle 0°}{4.32\angle -51°} = 2.31\angle 51°$

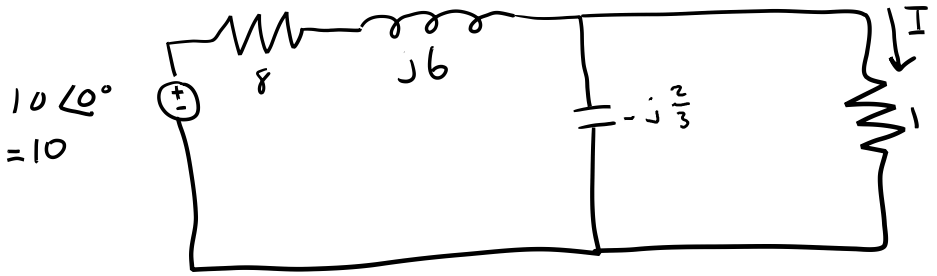
$i(t) = 2.31\cos(3t + 51°)\,A$

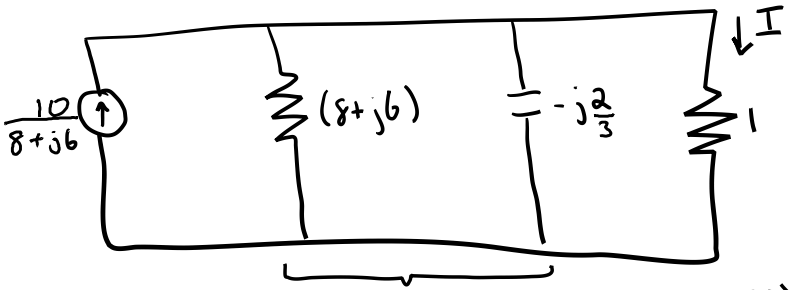
2. Find the current i(t).



$Z_L = \frac{1}{j\omega C} = \frac{1}{j(3)(\frac{1}{2})} = -\frac{j2}{3}$

$Z_L = j\omega L = j3 \cdot 2 = j6$

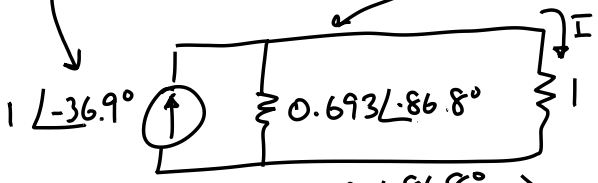




$\frac{10}{8+j6} = 1\angle -36.9°$

$Z_{eq} = (8+j6) \parallel -j\frac{2}{3} = \frac{(8+j6)(-j2/3)}{8+j6-j2/3} = 0.693\angle -86.8°$

Z's in parallel



$I = 1\angle -36.9 \left(\frac{0.693\angle -86.8°}{1 + 0.693\angle -86.8°} \right)$ current divider

$= 0.556\angle -90°$

$\boxed{i(t) = 0.556\cos(3t - 90°)\,A}$ or to show off, $i = 0.556\sin(3t)\,A$