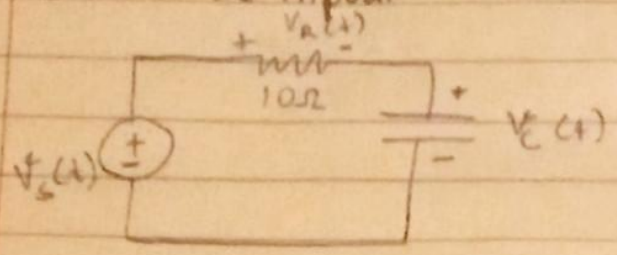
Q12 Current as input. Ref = $I \cos \omega t = 1 \angle 0$



$I(t) = 1 \sin(100t + 30^\circ)$
$\Rightarrow 1 \angle -60^\circ$

KVL $\Rightarrow V_S(t) = V_R(t) + V_C(t)$

$\Rightarrow V_S(t) = 10\, i(t) + \frac{1}{C} \int i(t)\, dt$

$= 1 \sin(100t + 30^\circ) + \frac{1}{1} \int 1 \sin(100t + 30^\circ)\, dt$

$= 1 \sin(100t + 30^\circ) + \frac{1\Omega \times -\cos(100t + 30^\circ)}{100}$

$V_S(t) = 1 \sin(100t + 30^\circ) + \frac{1}{10} \sin(100t - 60)$

$= 1 \angle -60 - \frac{1}{10} \angle 30$

$= 1.00005 \angle -60.57$

$\Rightarrow \boxed{V_S(t) = 1.00005 \sin(100t + 29.43)}$

$V_C(t) = \frac{1}{C} \int i(t)\, dt$

$= -\frac{1}{10} \cos(100t + 30)$

$\boxed{V_C(t) = \frac{1}{10} \sin(100t - 60^\circ)}$