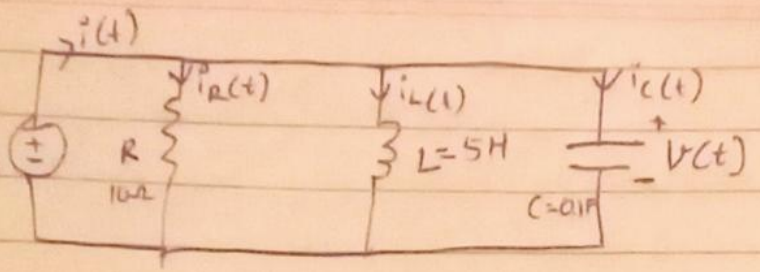
Q3



$i(t) = 20\cos(50t + 45°)A$

$$i(t) = i_R(t) + i_L(t) + i_C(t)$$

$$\Rightarrow i(t) = \frac{V(t)}{R} + \frac{1}{L}\int V(t).dt + C\frac{d(V(t))}{dt}$$

$$= \frac{V(t)}{10} + \frac{1}{Lj\omega}V(t) + Cj\omega V(t)$$

$$i(t) = 0.1V(t) + \frac{1}{250}V(t)j^{\circ} + 5V(t)j^{\circ}$$

~~$14.14 + 14.14j^{\circ} = 0.2V(t) + 5.0004V(t)j^{\circ}$~~

$$\Rightarrow V(0.1 + 5.0004j^{\circ}) = 20\sqrt{45}$$

$$\Rightarrow V = 3.998 \angle -43.85$$

$$\therefore \boxed{v(t) = 3.998\cos(50t - 43.85°)}$$

$$\boxed{i_{R_t} = 0.3998\cos(50t - 43.85°)}$$

$$i_{L_t} = \frac{1}{L}\int V(t)\,dt$$

$$\boxed{i_{L_t} = 0.016\sin(50t - 43.85°)}$$

$$\boxed{i_{C_t} = -1.99\sin(50t - 43.85°)}$$