Example 5 Vu(-t)(+ Find i(t) for t>0.

t 50:

i(o)=i(o)=0 (Cis an open ckt,)

 $V_c(\sigma) = 5V$ 

+ VR - + 12(0+)=1(0+)=0
- Mu - 2000t=0+:

VR+VI+VE=0 -v<sub>c</sub>(o+)=5V Ri +Ldi +v<sub>c</sub>=0

 $\frac{di}{dt}(d) = -\frac{1}{L} \left( v_c(d) + 0 \right)$ 

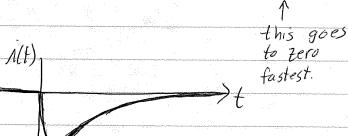
b + v2(x)=0

1(∞)=0

t=00:

Try different Leave these fixed (234) Values: R= 8.5 KD, L=1H, C= 0.25 UF=4UF  $V = \frac{R}{2L} = \frac{8.5 k \Omega}{2.7 (1 H)} = 4.250 s^{-1}$ Wo = TECT = 1 ms = 2,000 5 a> Wo, so this is overdamped  $S = -9 \pm \sqrt{9^2 w_0^2} = -4250 \pm \sqrt{(4250)^2 - (2000)^2}$  $= -4250 \pm 3,750$ 5,=-4,250+3750=-500 5, =-4250-3750 = -8,000 1(t) = Ae -500t + Be -8000t  $i(d) = 0 = A + B, \Rightarrow B = -A, so$ 1(t)=A = 500t - e - 8000t di = A -500 e -500t + 8000 e di (0+)= A |-500+8000] = 7500 A MYQQAINA 15 (0) = 0 from t=01: di(0+)=-5V=-5WA/s

$$-\frac{5}{7500} = A$$



$$\alpha = \frac{R}{2L} - \frac{4k\pi}{2(1H)} - 2,000 5$$

$$i(o^{\dagger})=C=0$$
, so

$$i(t) = Dte^{-\alpha t}$$

$$\frac{di}{dt} = D[e^{-\alpha t} - \alpha te^{-\alpha t}]$$

$$\frac{di}{dt}(o^{t}) = D[1 - o] = D = -\frac{5}{L} = -5 \text{ Ms}$$

$$A = \frac{R}{2L} = \frac{1000}{2(1)} = 500 \text{ s}^{-1}$$

$$U_d = \sqrt{W_0^2 - Q^{-2}}$$

$$= \sqrt{(2000)^2 - (500)^2}$$

$$= 1,9365^{-1}$$

$$F = \frac{dy(0') + qy(0')}{dx} = \frac{-5 + q(0)}{1936 + 5}$$

$$solution i(t) = e^{-500t} \left[ -2.58 \text{ mA} sin(1,936t) \right]$$



Contractor Contractor Contractor		-38/
	From these we can get other the pa	rameters
- Commonwealth		
S CHILDRANG SQUARE	like VR=Ri(t) => Same shape just a	a scale
A STATE OF THE PARTY OF THE PAR	Factor,	
denter constitution	$V_{\ell}(t) = L \frac{di}{dt}(t)$	PROPERTY OF CONTROL CO
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Sentration and an arrange	$V_c(t) = -\int Si(x)dx + V_c(o^t)$	
demotrace properties	$\frac{or}{v_c(t)} = -v_c(t) + v_r(t)$	
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V_(t)=#0,333Ve		
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distribution of the control	= 5.333 Ve <sup>-500t</sup> - 0.333 Ve <sup>-8000t</sup>	Catal Principles of the Catal Annual Catal Annual Catal Cata
-	$= 5.333 \text{Ve}^{-500t} - 0.333 \text{Ve}^{-8000t}$	ransamentales estation estatio

What about L+C in parallel?

$$v_{5} = \frac{1}{\sqrt{2}} \frac$$

KCL: iR + 1 L + 1 C=0

$$S_{1/2} = \frac{-\frac{1}{RC} + \sqrt{(\frac{1}{Rc})^2 - 4(1)(\frac{1}{Lc})^2}}{2(1)}$$

$$= -\frac{1}{2RC} + \sqrt{\left(\frac{1}{2RC}\right)^2 - \left(\frac{1}{LC}\right)^2}$$

$$S_{1,2} = -\alpha_{par} \pm \sqrt{\alpha_{par}^2 - w_o^2}$$



## For series we had

$$Q_{\text{Ser}} = \frac{R}{2L} = \frac{1}{2(L/R)} = \frac{1}{2T_L}$$

I remember these as follows:

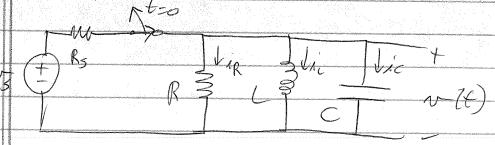
Series LC has a common Current Current 1s the state Variable for an Inductor,

50 9ser = 2TE

Parallel LC has a common Voltage, Voltage is the state variable for a Capacitor,

SO OPAR = 2TC

Example;



Find v(t)