PH421 Clicker questions

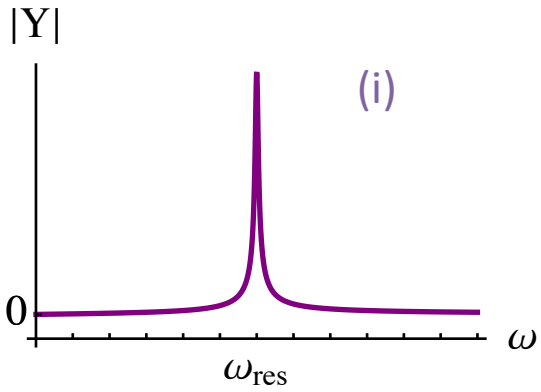
Series LRC Circuit

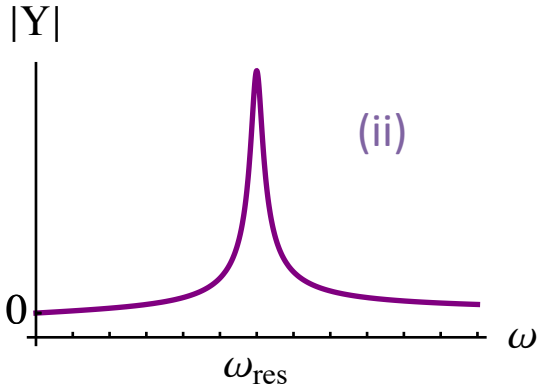
Which admittance plot $|Y(\omega)|$ corresponds to which free decay plot $I(t)$?

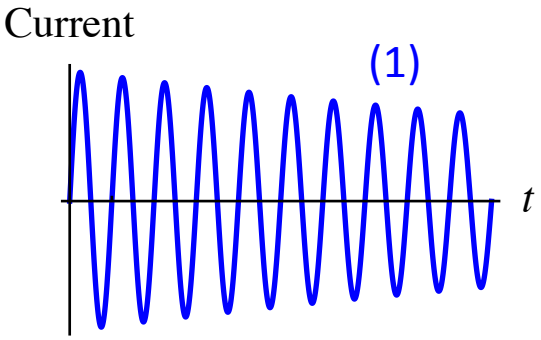
(All plots scaled to 1 at maximum value)

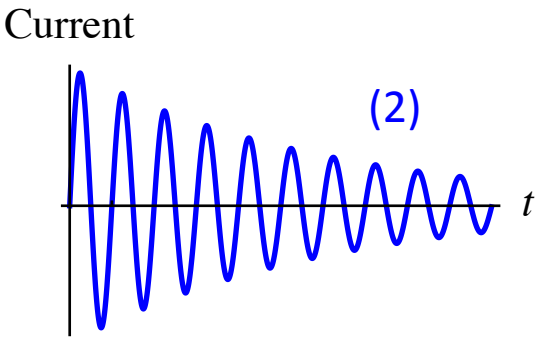
(A) i <-> 1, ii <-> 2

(B) i <-> 2, ii <-> 1



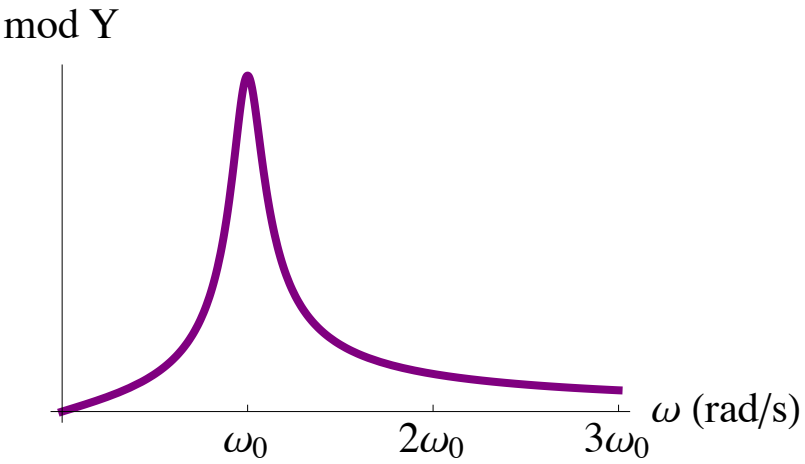


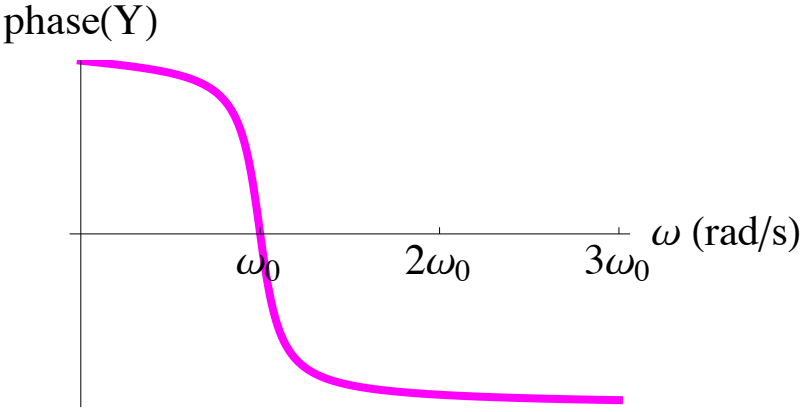




Series LRC Circuit

If the admittance $|Y(\omega)|$ and the phase ϕ_I response of a series LCR circuit are as given on the left below, then which oscilloscope trace on the right corresponds a circuit driven below resonance? Red is drive voltage, blue is current, represented by V_R.



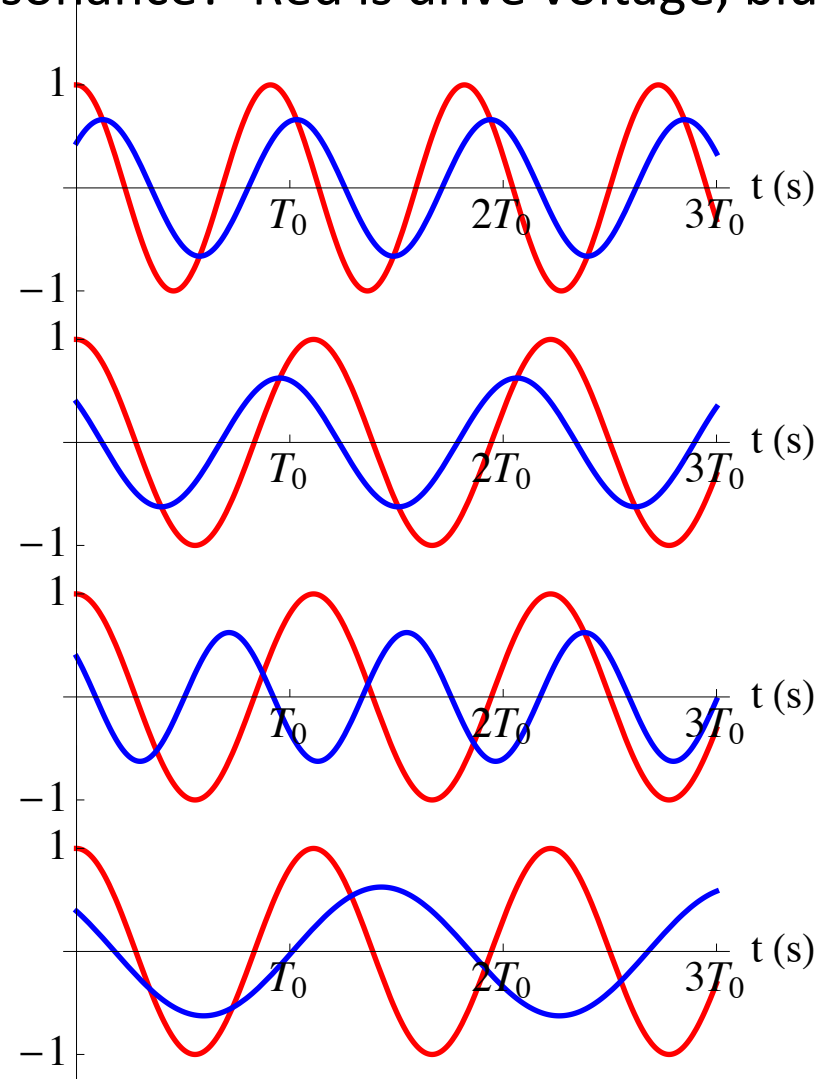


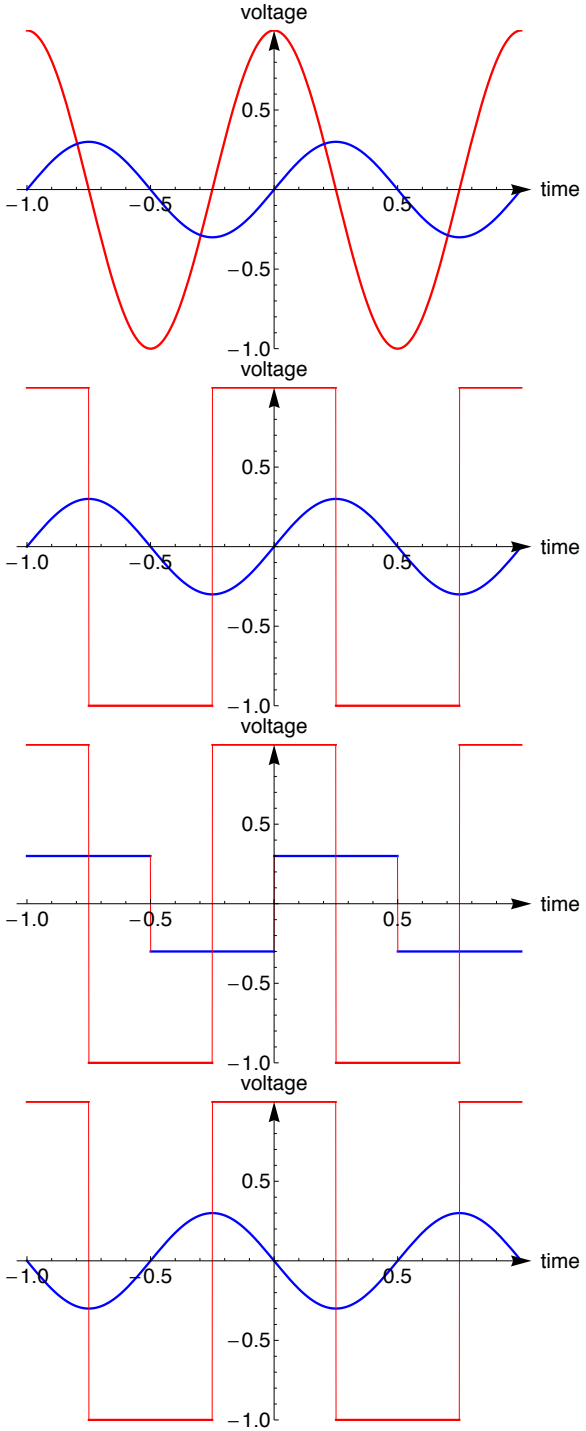
(A)

(B)

(C)

(D)



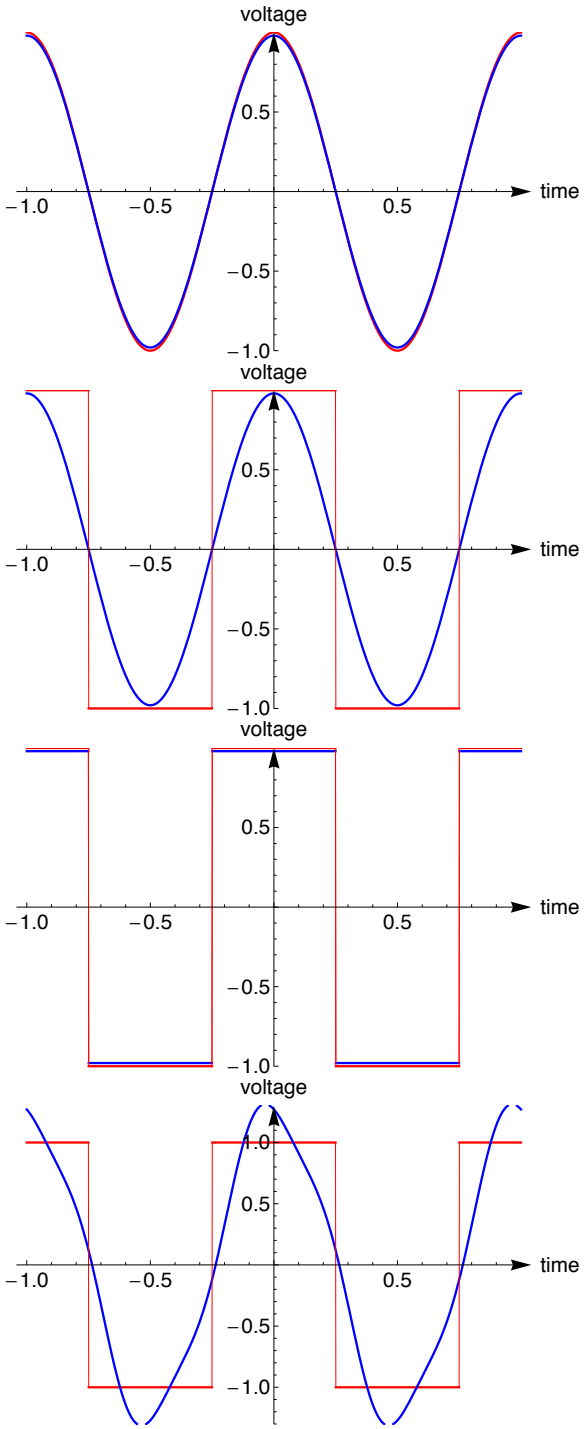


← Suppose that, if you apply a (red) sinusoidal voltage across a series LRC circuit, you measure the (blue) voltage response across the resistor.

← Now, if you now apply a (red) square-wave voltage with the same period to the same circuit, and you measure the (blue) voltage response across the resistor, will you get this ….?

← Or this?

← Or this? Or something else?



← Suppose that, if you apply a (red) sinusoidal voltage across a series LRC circuit, you measure the (blue) voltage response across the resistor.

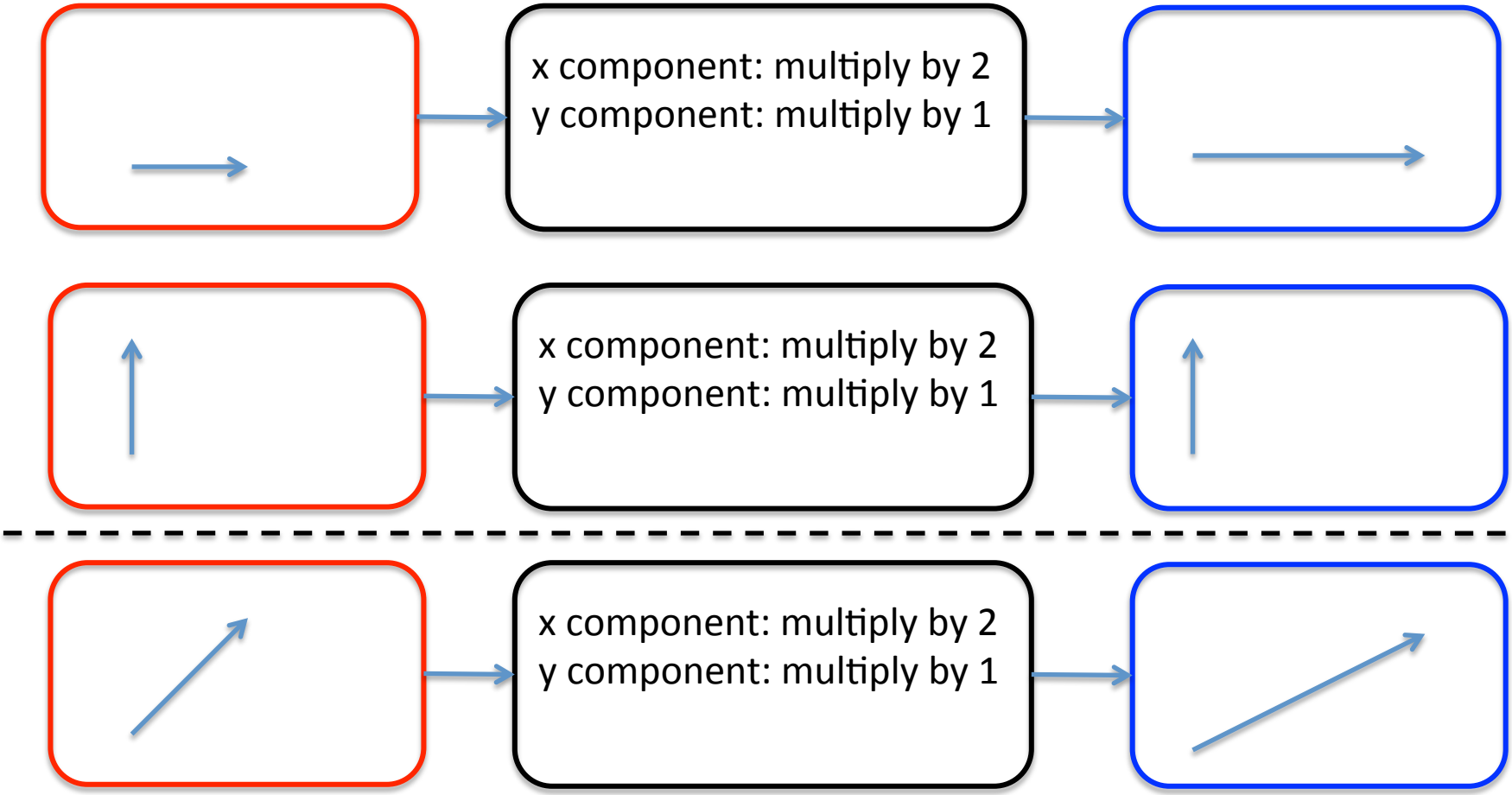
← Now, if you now apply a (red) square-wave voltage at the same frequency the same circuit, and you measure the (blue) voltage response across the resistor, will you get this ….

← Or this?

← Or this? Or something else?

Response functions

A mathematical function can be considered a box that receives input (a drive), and produces output (a response). Here the box tells how to treat each component of a 2-d vector.

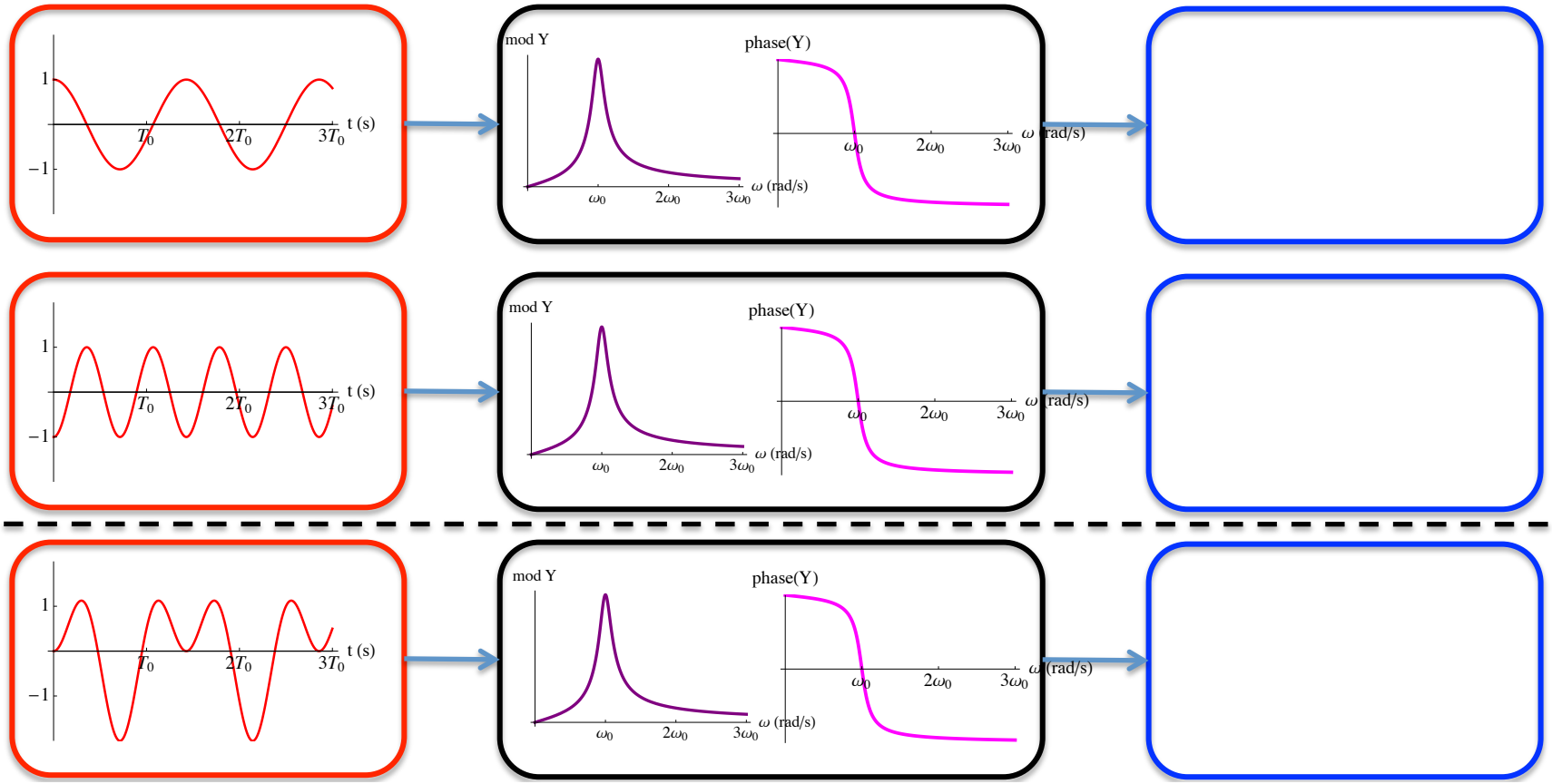


Response functions

A circuit can be considered a box that receives input (a drive), and produces output (a response). Again the box tells how to treat **each component**. We have to know what the components are.

$$\ddot{q} + 2\beta\dot{q} + \omega_0^2 q = V_0 e^{i\omega t}$$

$$\ddot{I} + 2\beta\dot{I} + \omega_0^2 I = i\omega V_0 e^{i\omega t}$$



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