

→ SPNS → 3/7/2016 - ELEC7004 - LECTURE 3

→ $y_1(t) = 7x_1(t)$

$$y_2(t) = 2x_2(t)$$

if $x_1 = 1$
 $x_2 = 2$

$$x_1 + x_2 = 3$$

then $y_1 = 7$
 $y_2 = 4$

$$y_1 + y_2 =$$

$$y_1 + y_2 = 11$$

→ Additivity

f: $y = 7x$

$$x_1 = 1$$

$$x_2 = 3$$

$$\longrightarrow y_1 = 7$$

$$y_2 = 21$$

$$x_1 + x_2 = 4$$

$$y_1 + y_2 = 28$$

$$y = 7(x_1 + x_2)$$

$$\longrightarrow y = 7(4) = 28$$

→ SUPERPOSITION

$$y = \pi x$$

$$x_1 = 1$$

$$x_2 = \pi/2$$

$$\rightarrow y_1 = \pi$$

$$y_2 = \pi^2/2$$

$$a = 4$$

$$b = 6$$

$$x_1(t) = a x_1(t) + b x_2(t)$$

$$x_1(t) = 4(1) + 6(\pi/2)$$

$$= 4 + 3\pi$$

$$y_1(t) = a y_1(t) + b y_2(t)$$

$$= 4(\pi) + 6(\pi^2/2) \checkmark$$

$$= 4\pi + 3\pi^2 \checkmark$$

$$y = \pi x$$

$$= \pi(4 + 3\pi)$$

$$= 4\pi + 3\pi^2 \checkmark$$

$$y = \pi x + 1$$

$$\begin{array}{l} x_1 = 1 \\ x_2 = \pi/2 \end{array} \rightarrow \begin{array}{l} y_1 = \pi + 1 \\ y_2 = \pi^2/2 + 1 \end{array}$$

$$\begin{array}{l} a = 4 \\ b = 6 \end{array}$$

$$\begin{aligned} x^*(t) &= a x_1(t) + b x_2(t) \\ &= 4(1) + 6(\pi/2) = \\ &= 4 + 3\pi \end{aligned}$$

$$\begin{aligned} y^*(t) &= a y_1(t) + b y_2(t) \\ &= 4(\pi + 1) + 6(\pi^2/2 + 1) \\ &= 4\pi + 4 + 3\pi^2 + 6 \\ &= 4\pi + 3\pi^2 + 10 \end{aligned}$$

$$\begin{aligned} y^* &= \pi(x^*) + 1 \\ &= \pi(4 + 3\pi) + 1 \\ &= 4\pi + 3\pi^2 + 1 \end{aligned}$$

