17.13 1)

ΔΕΔΟΜΕΝΑ	ΖΗΤΟΥΜΕΝΑ
$x^2(t)+y^2(t)=25$	α) $y(t_o)=;$
$x(t_o)=4$	β) $y'(t_o)=;$
$x'(t_o)=3$	
$y(t_o)>0$	

α) $x^2(t)+y^2(t)=25 \overset{\text{θέτουμε } t=t_o}{\Rightarrow} x^2(t_o)+y^2(t_o)=25 \overset{x(t_o)=4}{\Rightarrow} 4^2+y^2(t_o)=25 \Rightarrow$

$16+y^2(t_o)=25 \Rightarrow y^2(t_o)=25-16 \Rightarrow y^2(t_o)=9 \Rightarrow y(t_o)=\pm 3 \overset{y(t_o)>0}{\Rightarrow} \boxed{y(t_o)=3}$

β) $x^2(t)+y^2(t)=25 \overset{\text{παραγωγίζουμε}}{\Rightarrow} 2x(t)x'(t)+2y(t)y'(t)=0 \Rightarrow$

$\overset{t=t_o}{\Rightarrow} 2x(t_o)x'(t_o)+2y(t_o)y'(t_o)=0 \overset{\substack{x(t_o)=4,\ x'(t_o)=3 \\ y(t_o)=3}}{\Rightarrow} 2\cdot 4\cdot 3+2\cdot 3\cdot y'(t_o)=0 \Rightarrow$

$\Rightarrow 24+6y'(t_o)=0 \Rightarrow 6y'(t_o)=-24 \Rightarrow \boxed{y'(t_o)=-4}$

17.13 2)

ΔΕΔΟΜΕΝΑ	ΖΗΤΟΥΜΕΝΑ
$x^2(t)+y^2(t)=4$	α) $y(t_o)=;$
$x(t_o)=\sqrt{3}$	β) $y'(t_o)=;$
$x'(t_o)=-4$	
$y(t_o)>0$	

α) $x^2(t)+y^2(t)=4 \overset{\text{θέτουμε } t=t_o}{\Rightarrow} x^2(t_o)+y^2(t_o)=4 \overset{x(t_o)=\sqrt{3}}{\Rightarrow} \sqrt{3}^2+y^2(t_o)=4 \Rightarrow$

$3+y^2(t_o)=4 \Rightarrow y^2(t_o)=4-3 \Rightarrow y^2(t_o)=1 \Rightarrow y(t_o)=\pm 1 \overset{y(t_o)>0}{\Rightarrow} \boxed{y(t_o)=1}$

β) $x^2(t)+y^2(t)=4 \overset{\text{παραγωγίζουμε}}{\Rightarrow} 2x(t)x'(t)+2y(t)y'(t)=0 \Rightarrow$

$\overset{t=t_o}{\Rightarrow} 2x(t_o)x'(t_o)+2y(t_o)y'(t_o)=0 \overset{\substack{x(t_o)=\sqrt{3},\ x'(t_o)=-4 \\ y(t_o)=1}}{\Rightarrow} 2\cdot\sqrt{3}\cdot(-4)+2\cdot 1\cdot y'(t_o)=0 \Rightarrow$

$\Rightarrow -8\sqrt{3}+2y'(t_o)=0 \Rightarrow 2y'(t_o)=8\sqrt{3} \Rightarrow \boxed{y'(t_o)=4\sqrt{3}}$

17.13 3)

ΔΕΔΟΜΕΝΑ	ΖΗΤΟΥΜΕΝΑ
$2x^2(t)+3y^2(t)=11$	α) $x(t_o)=;$
$y(t_o)=-1$	β) $x'(t_o)=;$
$y'(t_o)=-4$	
$x(t_o)<0$	

α) $2x^2(t)+3y^2(t)=11 \overset{\text{θέτουμε } t=t_o}{\Rightarrow} 2x^2(t_o)+3y^2(t_o)=11 \overset{y(t_o)=-1}{\Rightarrow}$

$\Rightarrow 2x^2(t_o)+3\cdot(-1)^2=11 \Rightarrow 2x^2(t_o)+3=11 \Rightarrow 2x^2(t_o)=8 \Rightarrow$

$\Rightarrow x^2(t_o)=4 \Rightarrow x(t_o)=\pm 2 \overset{x(t_o)<0}{\Rightarrow} \boxed{x(t_o)=-2}$

β) $2x^2(t)+3y^2(t)=11 \overset{\text{παραγωγίζουμε}}{\Rightarrow} 4x(t)x'(t)+6y(t)y'(t)=0 \Rightarrow$

$\overset{t=t_o}{\Rightarrow} 4x(t_o)x'(t_o)+6y(t_o)y'(t_o)=0 \overset{\substack{y(t_o)=-1,\ y'(t_o)=-4\\ x(t_o)=-2}}{\Rightarrow} 4(-2)x'(t_o)+6(-1)(-4)=0 \Rightarrow$

$\Rightarrow -8x'(t_o)+24=0 \Rightarrow -8x'(t_o)=-24 \Rightarrow \boxed{x'(t_o)=3}$

17.13 4)

ΔΕΔΟΜΕΝΑ	ΖΗΤΟΥΜΕΝΑ
$x^2(t)-y^2(t)=5$	α) $x(t_o)=;$
$y(t_o)=2$	β) $x'(t_o)=;$
$y'(t_o)=-6$	
$x(t_o)<0$	

α) $x^2(t)-y^2(t)=5 \overset{\text{θέτουμε } t=t_o}{\Rightarrow} x^2(t_o)-y^2(t_o)=5 \overset{y(t_o)=2}{\Rightarrow}$

$\Rightarrow x^2(t_o)-2^2=5 \Rightarrow x^2(t_o)=9 \Rightarrow x(t_o)=\pm 3 \overset{x(t_o)<0}{\Rightarrow} \boxed{x(t_o)=-3}$

β) $x^2(t)-y^2(t)=5 \overset{\text{παραγωγίζουμε}}{\Rightarrow} 2x(t)x'(t)-2y(t)y'(t)=0 \Rightarrow$

$\overset{t=t_o}{\Rightarrow} 2x(t_o)x'(t_o)-2y(t_o)y'(t_o)=0 \overset{\substack{y(t_o)=2,\ y'(t_o)=-6\\ x(t_o)=-3}}{\Rightarrow} 2(-3)x'(t_o)-2\cdot 2\cdot(-6)=0 \Rightarrow$

$\Rightarrow -6x'(t_o)+24=0 \Rightarrow -6x'(t_o)=-24 \Rightarrow \boxed{x'(t_o)=4}$