Θέμα 1ο

A. $f(x) = (x^2+4x+5)^{20}$

$f'(x) = 20(x^2+4x+5)^{19}\cdot(2x+4)$

$f'(x)=0 \Leftrightarrow x^2+4x+5=0$ ή $2x+4=0$

$\Delta = 16-20=-4<0 \qquad 2x=-4$

$x=-2$

x	$-\infty$		-2		$+\infty$
f'		$-$	0	$+$	
f		$\searrow$	Ο.Ε.	$\nearrow$	

Η f παρουσιάζει στο $x=-2$ Ο.Ε.

το $f(-2)=1$

B. $\lim\limits_{h\to 0} \dfrac{f(-2+h)-f(-2)}{h} = f'(-2) = 20\cdot 1^{19}\cdot 0 = 0$

Γ. $f'(x)=0 \Leftrightarrow x=-2$

ε: $y-f(-2)=f'(-2)(x+2) \Leftrightarrow y-1=0 \Leftrightarrow y=1$

Δ1. $A(x,1)$

$x'(t)=2t$ cm/sec

$t=0 \quad B(0,5^{20})$

$x'(t)=2t$

Άρα $x(t)=t^2+c$

$t=0$: $0=0+c \Rightarrow c=0$

Άρα $x(t)=t^2$

$AO=\sqrt{(0-x)^2+(0-1)^2}=\sqrt{x^2+1}$

$g(x)=\sqrt{x^2+1}$

$g'(x)=\dfrac{1}{2\sqrt{x^2+1}}\cdot 2x=\dfrac{x}{\sqrt{x^2+1}}$

$g'(1)=\dfrac{1}{2}$ cm/sec

Δ2. $AO=\sqrt{x^2(t)+1}=\sqrt{t^2+1}$

$\left.\begin{array}{l} x(t)=t^2 \\ x(t)=1 \end{array}\right\} \Rightarrow t^2=1$

$t=1$ ή $t=-1$

$h(t)=\sqrt{t^2+1}$

$h'(t)=\dfrac{1}{2\sqrt{t^2+1}}\cdot 2t=\dfrac{t}{\sqrt{t^2+1}}$

$t=1 \quad h'(1)=\dfrac{1}{2}$ cm/sec $\qquad t=-1 \quad h'(-1)=-\dfrac{1}{2}$ cm/sec