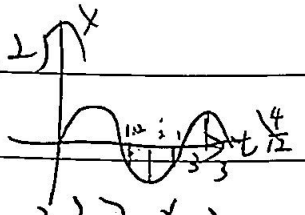
237. 6-1

(1) 设 $X=0.12\cos(\omega t+\varphi)$ $X(0)=0.12\cos\varphi=0.06 \Rightarrow \varphi=\frac{\pi}{3}$

~~$X(1)=0 \Rightarrow \omega+\frac{\pi}{3}=\frac{\pi}{2} \Rightarrow \omega=\frac{\pi}{6}$ $\therefore X=0.12\cos(\frac{\pi}{6}t+\frac{\pi}{3})$~~

(2) 

~~$T=\frac{2\pi}{\omega}\cdot\frac{3}{2}=\frac{1}{2}=4s$~~ ~~$X(1)$~~ $\omega\cdot 1+\varphi=\frac{5}{3}\pi \Rightarrow \omega=\frac{4}{3}\pi$

$\therefore X=0.12\cos(\frac{4}{3}\pi t+\frac{\pi}{3})$ (m)

$t=T\cdot\frac{1}{3}=\frac{2\pi}{\omega}\cdot\frac{1}{3}=\frac{1}{2}s$.

237. 6-2

$T\cdot\frac{4}{12}=1 \Rightarrow T=3s$

237. 6-5

(1) ~~$\frac{1}{2}m$~~ $\frac{1}{2}kX^2=mgh \Rightarrow \frac{k}{m}=200=\omega^2 \Rightarrow \omega=10\sqrt{2}$ rad/s, $f=\frac{5\sqrt{2}}{\pi}s^{-1}$

(2) $\frac{1}{2}mV^2-0=mgX'-\frac{1}{2}kX'^2 \Rightarrow V=\frac{2}{5}\sqrt{2}$ m/s

237. 6-6

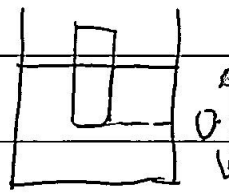
$T=2s \Rightarrow \omega=\frac{2\pi}{T}=\pi$ rad/s $A=0.12$

$0.12\cos\varphi=0.06 \Rightarrow \varphi=\frac{\pi}{3}$ $\therefore X=0.12\cos(\pi t+\frac{\pi}{3})$

$V=0.12\pi\cos(\pi t+\frac{\pi}{3}+\frac{\pi}{2})$ $a=0.12\pi^2\cos(\pi t+\frac{\pi}{3}+\pi)$

$\therefore X(0.5)=\frac{3\sqrt{3}}{50}$(m) $V(0.5)=-\frac{3}{50}\pi$(m/s) $a(0.5)=-\frac{3\sqrt{3}}{50}$ m/s²

~~237.~~ 237. 6-9

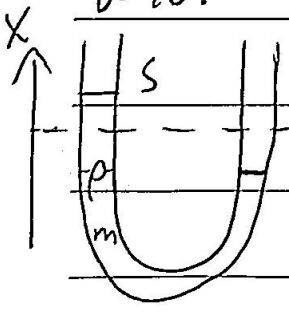


$F_{浮}=\rho g(h_0+X)\cdot S$,

$mg-F_{浮}=mg-\rho g h_0 S-\rho g S\cdot X=-\rho g S\cdot X$

$\therefore$ 得证. $\omega=\sqrt{\frac{\rho g S}{m}}$, $T=\frac{2\pi}{\omega}=4\sqrt{\frac{m\pi}{\rho g d^2}}$

6-10.



左端所受压力 $F=(\frac{L}{2}+X)\rho g\cdot S$

$\therefore F-\frac{1}{2}mg=(\frac{L}{2}+X)\rho g S-\frac{1}{2}mg=\rho g S\cdot X=-\rho g S(-X)$

$\therefore$ 得证, 左端回复.