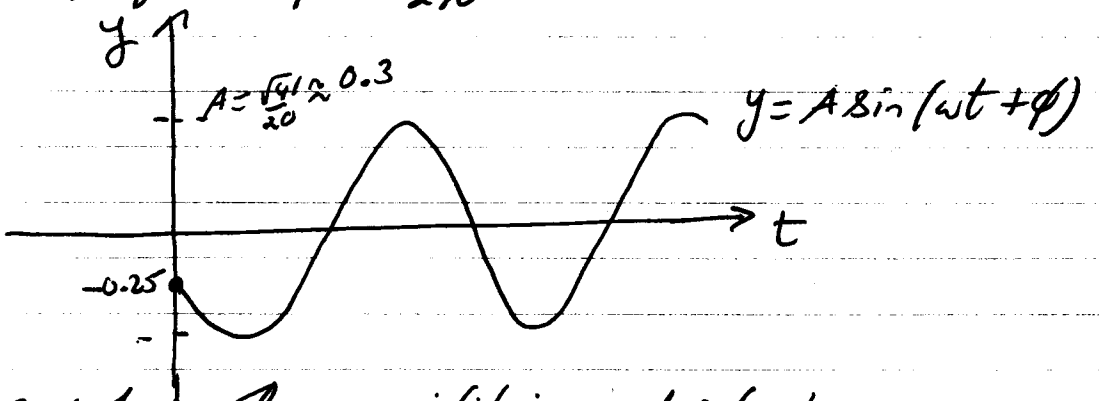
The <u>equation of motion</u> is

$y = A \sin(\omega t + \phi)$, where $\omega = 5$, $A = \frac{\sqrt{41}}{20}$,
$\phi = \tan^{-1}\left(\frac{5}{4}\right) + \pi \approx 4.04$

Period $= T = \frac{2\pi}{\omega} = \frac{2\pi}{5}$ (secs)
Amplitude $= A = \frac{\sqrt{41}}{20}$ (m)

angular freq $= \omega = 5$ (rad/s)
Nat. freq $= \frac{1}{T} = \frac{5}{2\pi}$ (cycles/sec).



mass passes thro equilibrium point when

$\omega t + \phi = n\pi$ (n integer).
$\omega t = n\pi - \phi$ ($\pi < \phi < 3\pi/2$)
$\omega t = 2\pi - \phi = 2\pi - (\tan^{-1}(5/4) + \pi)$
$= \pi - \tan^{-1}(5/4)$

Time when passes equil. pt first is

$$t = \frac{1}{\omega}\left(\pi - \tan^{-1}(5/4)\right) = \frac{1}{5}\left(\pi - \tan^{-1}(5/4)\right)$$

≈ 0.45 secs.