~~2.~~ $\nu = \frac{1}{T}$

$T = \frac{1}{\nu} = \frac{1}{2} = 0.5\ s$

4. $F_{max} = mg + ma_{max}$

$= 0.4(10 + a_{max}) = 4.16$

$a_{max} = 30\ m/s^2$

$x(t) = 0.1\sin(\omega t + \varphi)$

$v(t) = 0.1\omega\cos(\omega t + \varphi)$

$a(t) = -0.1\omega^2\sin(\omega t + \varphi)$

$0.1\omega^2 = 30$

$\omega = \sqrt{300}$