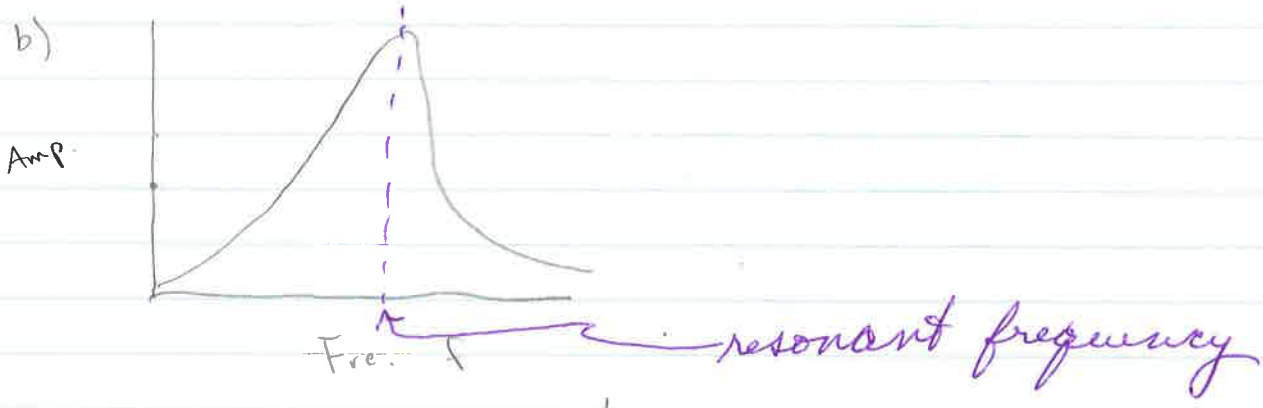
Q2 a)

b)



Q3 a) $f = 3 \frac{\text{cycles}}{\text{sec}}$ $T = \frac{1}{3}$ seconds/cyc.

b) $y(t) = X(A)\cos(\omega t)$ y:

c) $v(t) = -\omega X \sin(\omega t)$

$f = \frac{\omega}{2\pi}$ $3(2\pi) = \omega$

$6\pi = \omega$

$v(.36) = 3.6\pi \frac{m}{s}\left(\sin(6\pi \cdot .36)\right) = -27.24$ m/s

Q4 $m = .4$ kg $K = 10$ N/m $x = .2$ m $v = 1$ m/s

a) $\mathcal{E}_{TOT} = PE_{spring} + KE$

$\frac{1}{2}kx^2 + \frac{1}{2}mv^2$

$\frac{1}{2}(10\frac{N}{m})(.2m)^2 + \frac{1}{2}(.4kg)(1\frac{m}{s})^2$

$5(.04)\,J + .2\,J$

$\mathcal{E}_{TOT} = .4\,J$

b) $\mathcal{E}_{Tot} = \frac{1}{2}kX^2$

$.4\,J = \frac{1}{2}(10\frac{N}{m})X^2$

$\sqrt{.08m^2} = X$ $X = .283$ m

Q5 $X = .035m$ $f = \frac{\omega}{2\pi}$ $\frac{92}{2\pi}$ $f = 14.7/s$

$\tau = \frac{1}{f}$ $\frac{1}{14.7}$ $\tau = .068s$ $k\lambda = 2\pi$

$\lambda = \frac{2\pi}{k}$ $\lambda = \frac{2\pi}{2.7/m}$ $\lambda = 2.33m$

$V_w = \lambda f = (2.3m)(14.7/s)$ $V_w = 34.2 m/s$

moving to Right because it is $\cos(kx \pm \omega t)$

b) $V_0 = 34.2 m/s$ $T_0 = T_F$ $V_0 = \sqrt{\frac{T_0}{2\mu_0}}$ $V_F = \sqrt{\frac{T_F}{\mu_F}}$

$V_F = 24 m/s$ $2\mu_0 = \mu_F$ $V_0 = \frac{1}{\sqrt{2}} V_F$

Q6 a) $A = .6 \times .8 = .48$

$\mathcal{E} = I \cdot A \cdot t$

$(1400 W/m^2)(.48 m^2)(1 hr)$

672 Joules/s for 1 hour → 2419200 $W \cdot s = J$

b) $\frac{1400}{1} = \frac{2100}{1.5}$ 3600s 2.4 MJ

1.5 x Farther

Sun — Earth — Mars

$1.5^2 = 2.25$ $622 W/m^2$ $\frac{1400}{2.25}$

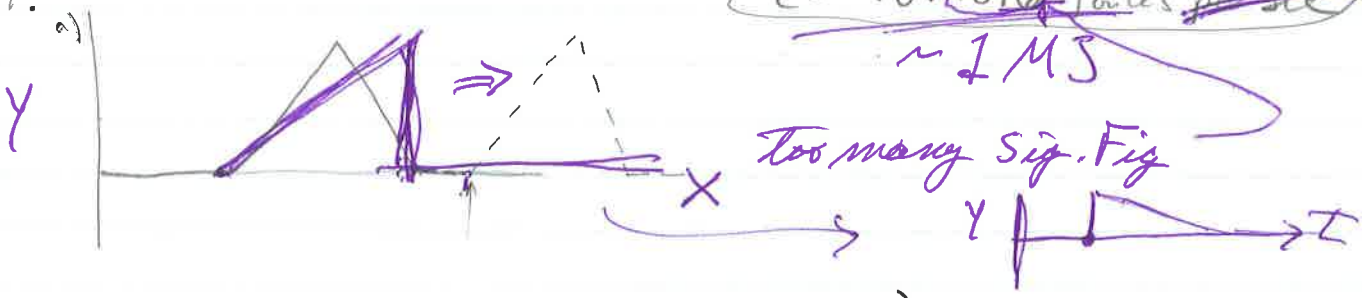
$\mathcal{E} = I \cdot A \cdot t$ $(622 W/m^2)(.48)(1)$

$\mathcal{E} = 1071$ Joules ~1 MJ

Too many Sig. Fig

Q7.

a)



b) $\lambda = 4$ $\tau = .02 sec$ $V = \frac{\lambda}{\tau}$

$V = 200 m/s$