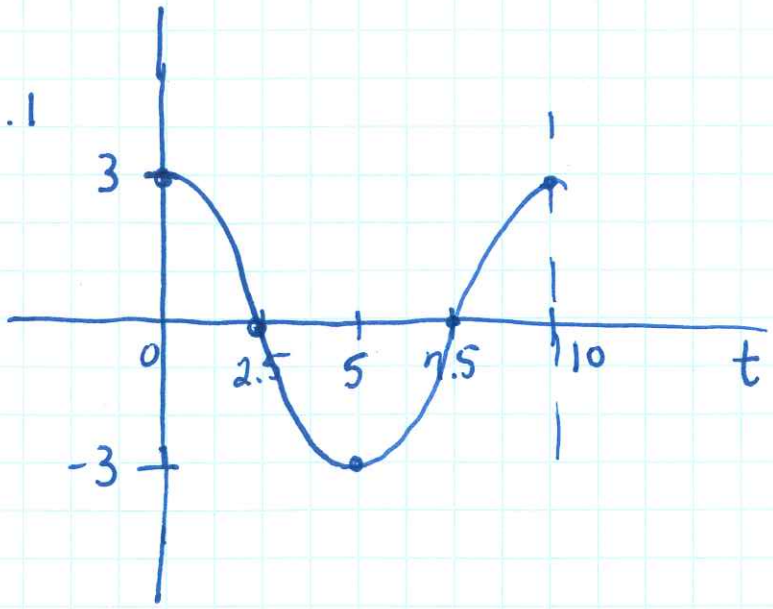
Ex. 1



$|A| = 3$

$NP = 10s \quad B = \frac{2\pi}{10}$

$B = \frac{\pi}{5}$

$PS = 0$ for cosine

$PS = \rightarrow 7.5$ sec for sine

$VS = 0$

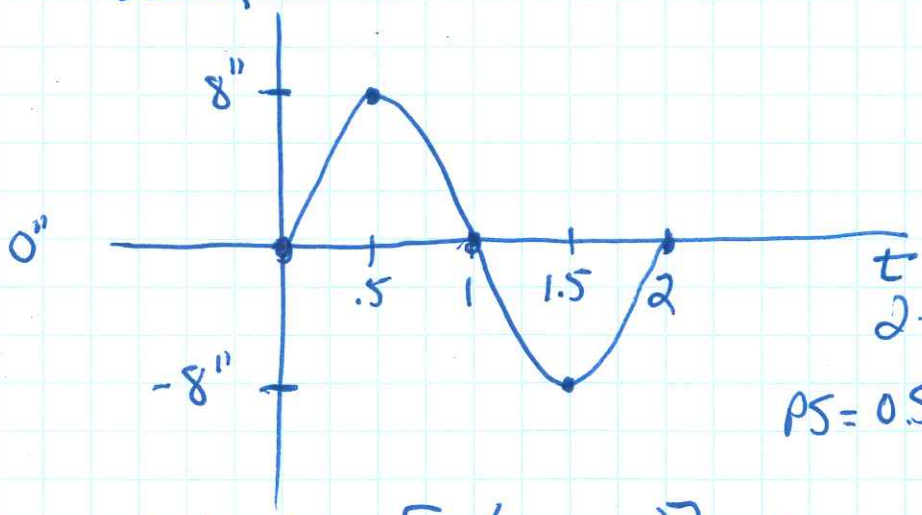
$f(t) = 3\cos\left[\frac{\pi}{5}(t-0)\right] + 0$

$= 3\cos\frac{\pi}{5}t$

$f(t) = 3\sin\left[\frac{\pi}{5}(t-15/2)\right] + 0$

$= 3\sin\left(\frac{\pi}{5}t - \frac{3\pi}{2}\right)$

Ex 2



$|A| = \frac{8-(-8)}{2} = 8$

$VS = \frac{8-8}{0} = 0$

$NP = 2$ sec $\quad B = \frac{2\pi}{2} = \pi$

$2 \div 4 = 0.5$ sec critical pt every 0.5 sec

$PS = 0.5$ sec for cos $\quad PS = 0$ for sine

$h(t) = 8\cos[\pi(t-0.5)] + 0$

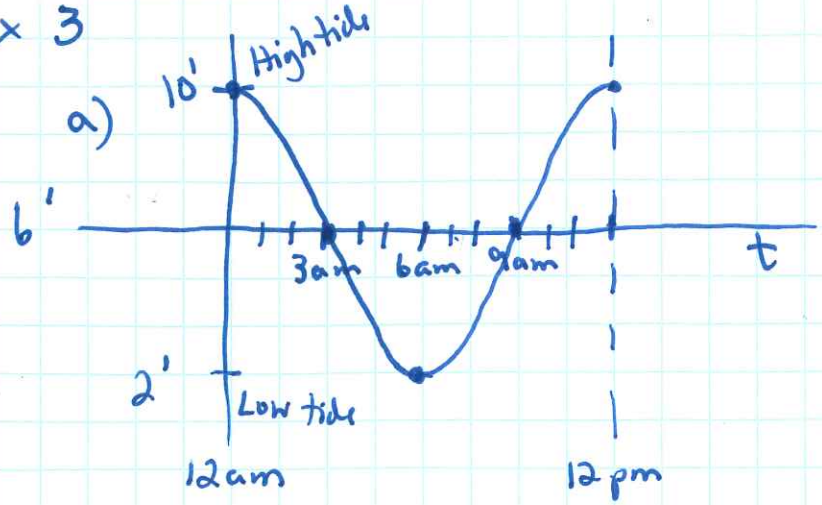
$= 8\cos\left(\pi t - \frac{\pi}{2}\right)$

$h(t) = 8\sin[\pi(t-0)] + 0$

$= 8\sin(\pi t)$

Ex 3

a)



Intervals on x-axis = 1 hr

$|A| = \frac{10-2}{2} = 4$

$VS = \frac{10+2}{2} = 6$

$NP = 12$ hr $\quad B = \frac{2\pi}{12} = \frac{\pi}{6}$

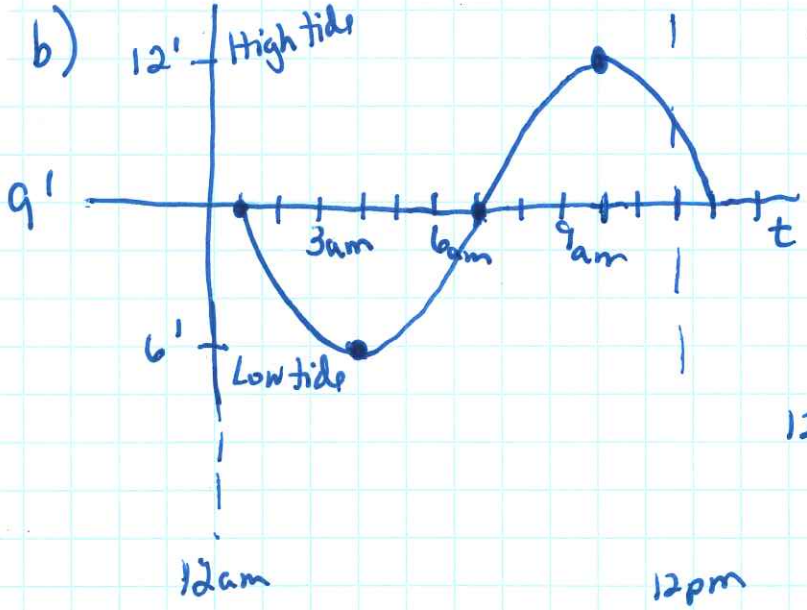
$12 \div 4 = 3$ hr critical pts occur every 3 hr

$PS = 0$ for cosine

$PS = 9$ for sine

$$h(t) = 4\cos\left[\tfrac{\pi}{6}(t-0)\right] + 6$$
$$= 4\cos\left(\tfrac{\pi}{6}t\right) + 6$$
$$h(t) = 4\sin\left[\tfrac{\pi}{6}(t-9)\right] + 6$$
$$= 4\sin\left[\tfrac{\pi}{6}t - \tfrac{3\pi}{2}\right] + 6$$

b)



Intervals on x-axis = 1 hr

$|A| = \frac{12-6}{2} = 3$

$VS = \frac{12+6}{2} = 9$

$NP = 12$ hr $\quad B = \frac{2\pi}{12} = \frac{\pi}{6}$

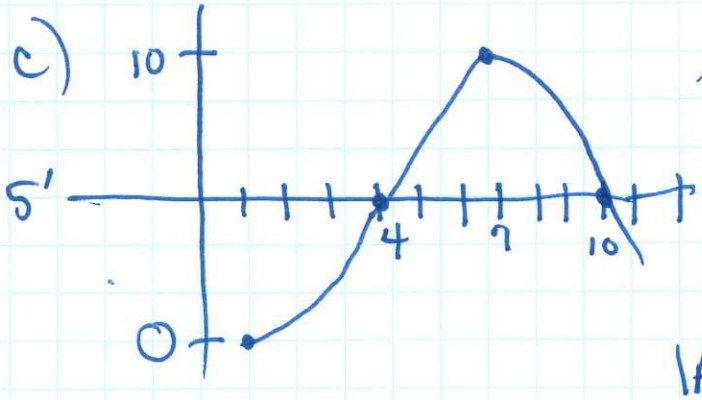
$12 \div 4 = 3$ hr critical pts occur every 3 hrs

$PS = 10$ for cosine

$PS = 7$ for sine

$$h(t) = 3\cos\left[\tfrac{\pi}{6}(t-10)\right] + 9$$
$$= 3\cos\left[\tfrac{\pi}{6}t - \tfrac{5\pi}{3}\right] + 9$$
$$h(t) = 3\sin\left[\tfrac{\pi}{6}(t-7)\right] + 9$$
$$= 3\sin\left[\tfrac{\pi}{6}t - \tfrac{7\pi}{6}\right] + 9$$

Ex 3 c)



VS $= \frac{\max + \min}{2}$

$5 = \frac{10 + \Phi}{2}$

$0 = y$

$|A| = \frac{10+0}{2} = 5$

NP = 12 $\quad B = \frac{2\pi}{12} = \pi/6$

$12 \div 4 = 3$ hr critical pts every 3 hrs

PS = 7 for cos $\quad$ PS = 4 for sin

$h(t) = 5\cos[\pi/6(t-7)] + 5$

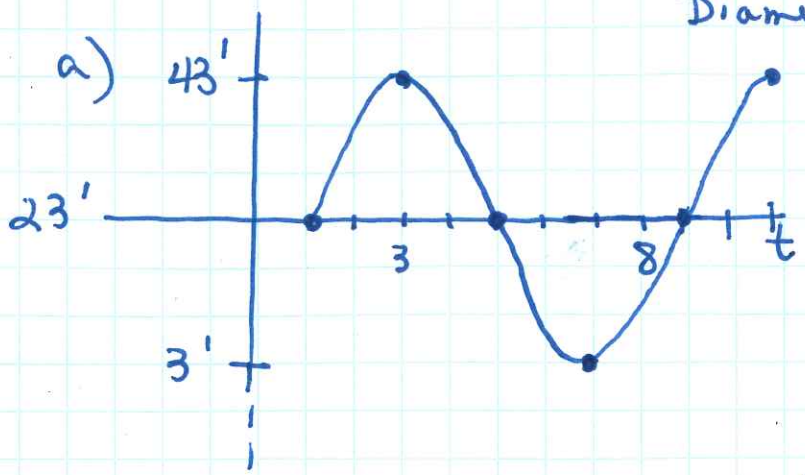
$= 5\cos[\pi/6 t - 7\pi/6] + 5$

$h(t) = 5\sin[\pi/6(t-4)] + 5$

$= 5\sin[\pi/6 t - 2\pi/3] + 5$

Ex. 4

Diameter = 40' radius = 20'

a) 

$20 = \frac{43 - y}{2}$ $|A| = 20$

$40 = 43 - y$

$3' = y$.

$VS = \frac{43 + 3}{2} = 23'$

$NP = 8$ sec $B = \frac{2\pi}{8} = \frac{\pi}{4}$

b) lowest height = 3' above ground

Interval on x axis = 1 second

$8 \div 4 = 2$ critical pts every 2 sec

PS = 3 sec for cosine

PS = 1 sec for sine

c) $h(t) = 20\cos\left[\pi/4(t-3)\right] + 23$

$= 20\cos\left[\pi/4\,t - 3\pi/4\right] + 23$

$h(t) = 20\sin\left[\pi/4(t-1)\right] + 23$

$= 20\sin\left[\pi/4\,t - \pi/4\right] + 23$

d) i) $t = 6$ $h(6) = 20\sin\left[\pi/4(6) - \pi/4\right] + 23$

$h(6) = 8.86'$

ii) $t = 4.33$ $h(4.33) = 20\sin\left[\pi/4(4.33) - \pi/4\right] + 23 = 33.05'$

iii) $t = 9$ $h(9) = 20\sin\left[\pi/4(9) - \pi/4\right] + 23 = 23'$

iv) $t = 0$ $h(0) = 20\sin\left[\pi/4(0) - \pi/4\right] + 23 = 8.86'$

e) Last seat filled at $t = 0$, so I was 8.86' from the ground.