

HW 9E: 6, 7, 9, 10

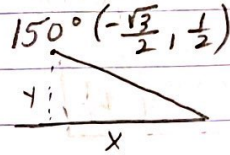
6.) $C(t) = a \sin(15t)^\circ + d$ cents per litre

a.) 120 b.) period = $\frac{360}{15} = 24 \therefore$ every 24 days

c.) $129 = a \sin(15 \cdot 10)^\circ + 120$

$9 = a \sin(150)^\circ$

$9 = \frac{1}{2}a \therefore a = 18$



d.) amplitude is 18 \therefore minimum = $120 - 18 = 102$ cents/litre

e.) $C(t) = 18 \sin(15 \cdot 17)^\circ + 120$

$= 18 \sin(255)^\circ + 120$ type into calc (255 is not a special angle)

$\approx 102.6 \therefore \approx 103$ cents/litre

7.) $F(t) = a \sin(bt)^\circ + d$ (40, 10.63) (132, 11.32)

a.) period = 365 = $\frac{360}{b} \therefore b = \frac{360}{365} = \frac{72}{73}$

b.) $10.63 = a \sin\left(\frac{72}{73}(40)\right)^\circ + d \rightarrow 10.63 = 0.635a + d$
 subtract to eliminate d

$11.32 = a \sin\left(\frac{72}{73}(132)\right)^\circ + d \rightarrow 11.32 = 0.764a + d$

$\begin{array}{r} -0.69 = -0.129a \\ \hline -0.129 \quad -0.129 \end{array}$

$a \approx 5.35$

$\therefore 10.63 = 5.35(0.635) + d$

$10.63 = 3.40 + d$

$\therefore d \approx 7.23$

c.) period 365

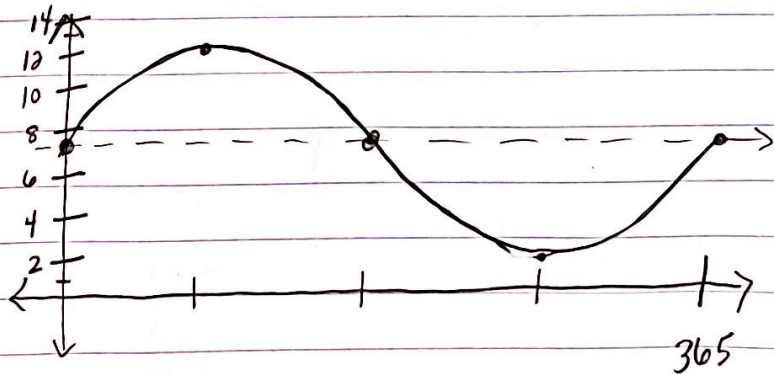
range: $1.88 \leq y \leq 12.58$

d.) $5.35 \sin\left(\frac{72}{73}(252)\right)^\circ + 7.23$

≈ 2.25 tonnes

e.) min: 1.88 tonnes

max: 12.58 tonnes



(answers will vary slightly based on rounding)

9.) a.) $d = 4$ m (X at its starting position is on the principal axis and is 4 m above the bottom of the boat)

$a = 3$ m (radius of wheel)

$b \Rightarrow$ period is 4 seconds $\therefore 4 = \frac{360}{b} \Rightarrow b = \frac{360}{4} = 90$

$$\therefore H(t) = 3 \sin(90t)^\circ + 4$$

b.) $3 \sin(90 \cdot 6.5)^\circ + 4 \approx 1.88$ m

\therefore X is below water because the water line is at 2 m

10.) period: 2 revolutions each second \rightarrow 1 revolution each $\frac{1}{2}$ s.

$$\therefore \frac{1}{2} = \frac{360}{b} \rightarrow b = 720$$

$$H(t) = 60 \cos(720t)^\circ + 70$$

max = 130 cm $a = 60$ cm (radius)

$$\therefore d = 130 - 60 = 70 \text{ cm}$$

b.) $60 \cos(720 \cdot 3.9)^\circ + 70$
 $= 88.5$ cm