Assignment #13

3/7/2001

19.3

(#12) a) if $\tan\beta = 7$ (β is a constant)

$\tan x = 7$ for all x, such that $x = \beta + n\pi$

(n = integers)

b) $\tan x = -7$ for all x, such that $x = -\beta + n\pi$

(n = integer)

19.4

(#9) (Extra Credit)

a) period of $h(t) = 5\cos(\pi t)$

$$\text{period} = \frac{2\pi}{|B|} = \frac{2\pi}{\pi} = \boxed{2 \text{ sec}}$$

b) in 2sec, large gear makes 1 complete circle

chain travels circumference $= \pi(10 \text{ in}) = 10\pi$ in.

c) once

d) circumference of small gear $= \pi(4) = 4\pi$

in 2sec, rotates $\frac{10\pi}{4\pi} = 2\frac{1}{2}$ times

in 1sec, rotates $1\frac{1}{4}$ times

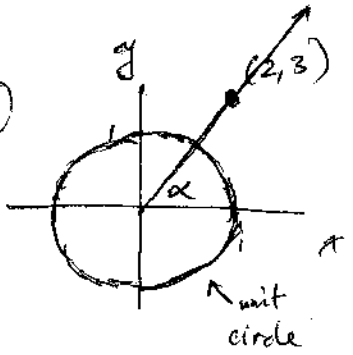
e) Period: $1\frac{1}{4}P = 1 \text{ sec}$ $\quad P = \frac{4}{5}\text{ sec} \Rightarrow B = \frac{5}{2}\pi$

amplitude = 2

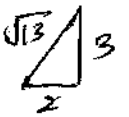
starts @ max $\longrightarrow$ so, use $y = \cos x$

$$h(t) = 2\cos\left(\frac{5\pi}{2}t\right)$$

#10



$P(\alpha) = (\cos\alpha, \sin\alpha) = \left(\frac{2}{\sqrt{13}}, \frac{3}{\sqrt{13}}\right)$

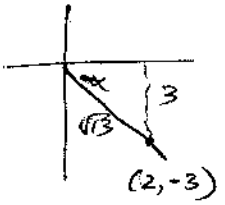


$P(-\alpha) = (\cos -\alpha, \sin -\alpha) = \left(\frac{2}{\sqrt{13}}, -\frac{3}{\sqrt{13}}\right)$

$P(\pi+\alpha) = \left(-\frac{3}{\sqrt{13}}, \frac{2}{\sqrt{13}}\right)$

c) $\tan\alpha = \frac{\sin\alpha}{\cos\alpha} = \frac{\frac{3}{\sqrt{13}}}{\frac{2}{\sqrt{13}}} = \boxed{\frac{3}{2}}$

d) $\sin(-\alpha) = -\frac{3}{\sqrt{13}}$



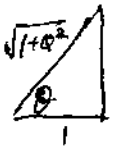
20.1

#1 a)

$\sin\theta = \frac{opp}{hyp} = \frac{4}{5}$ $\cos\theta = \frac{3}{5}$ $\tan\theta = \frac{4}{3}$

$\csc\theta = \frac{5}{4}$ $\sec\theta = \frac{5}{3}$ $\cot\theta = \frac{3}{4}$

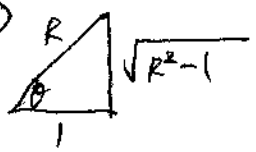
b)



$\sin\theta = \frac{Q}{\sqrt{1+Q^2}}$ $\cos\theta = \frac{1}{\sqrt{1+Q^2}}$ $\tan\theta = \frac{Q}{1} = Q$

$\csc\theta = \frac{\sqrt{1+Q^2}}{Q}$ $\sec\theta = \sqrt{1+Q^2}$ $\cot\theta = \frac{1}{Q}$

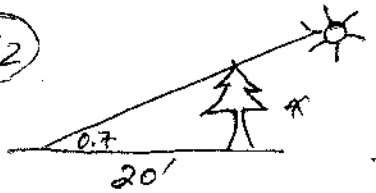
c)



$\sin\theta = \frac{\sqrt{R^2-1}}{R}$ $\cos\theta = \frac{1}{R}$ $\tan\theta = \sqrt{R^2-1}$

$\csc\theta = \frac{R}{\sqrt{R^2-1}}$ $\sec\theta = R$ $\cot\theta = \frac{1}{\sqrt{R^2-1}}$

#2

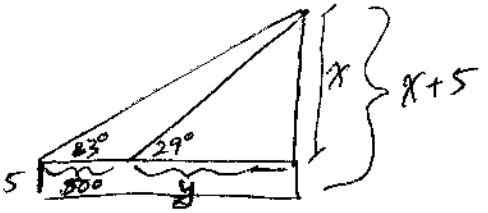


x = tree height

$\tan 0.7 = \frac{x}{20}$ (use radians!)

$x = 20\tan 0.7 = 16.8$ feet

#6



$\tan 23° = \frac{x}{y+500}$ $\quad \tan 29° = \frac{x}{y} \Rightarrow y = \frac{x}{\tan 29°}$

substitute for y : $\tan 23° = \frac{x}{\frac{x}{\tan 29°} + 500}$

cross multiply : $\tan 23° \left(\frac{x}{\tan 29°} + 500\right) = x$

$\frac{\tan 23°}{\tan 29°} x + 500 \tan 23 = x$

$0.766x + 212.2 = x$

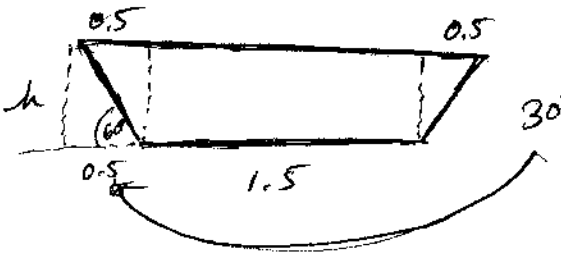
$212.2 = 0.234x$

$906 \text{ ft.} = x$

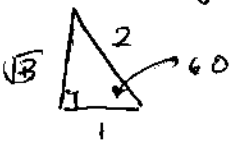
height of monument valley = $906 + 5 =$ **911'**

20.2

#8



30-60-90° triangle!



(ratios

$h = 0.5\sqrt{3} = \frac{\sqrt{3}}{2}$

area = $\underbrace{(1.5)\left(\frac{\sqrt{3}}{2}\right)}_{\text{rectangle}} + 2\underbrace{\left(\frac{0.5 \cdot \frac{\sqrt{3}}{2}}{2}\right)}_{\text{triangle}}$

$= \frac{3\sqrt{3}}{4} + \frac{\sqrt{3}}{4} =$ **$\sqrt{3}$**