121 PT # 1

FALL, 2017

1) $\left(\frac{23\pi}{5}\right)\left(\frac{180}{\pi}\right) = 828^\circ$ → From $\frac{828}{360} \approx 2.3$ & $2 * 360 = 720$

$828 - 720 = 108^\circ$ OR $\frac{3\pi}{5}$

$-360 + 108 = -252^\circ$ OR $-\frac{7\pi}{5}$

2) $r = 6$ in, $\theta = 7000^\circ$

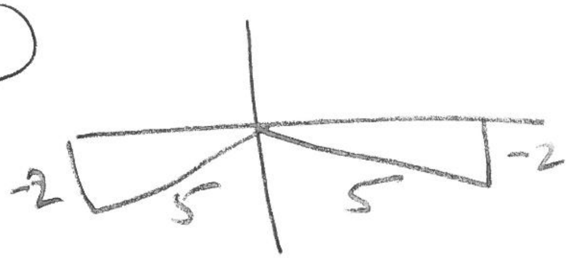
$S = r\theta = 6(7000)\left(\frac{\pi}{180}\right) = \boxed{\frac{700\pi}{3} \text{ in}} \approx \boxed{733.038 \text{ in}}$

3) $A = \frac{1}{2}r^2\theta = \frac{1}{2}(20)^2\left(\frac{5\pi}{4}\right) = \frac{1}{2}(400)\left(\frac{5\pi}{4}\right)$

$= (50)(5\pi) = \boxed{250\pi \text{ cm}^2}$

4) $\csc\theta = -\frac{5}{2}$ i.e. $\sin\theta = -\frac{2}{5}$

a)



$\sin\theta = -\frac{2}{5}$ $\csc\theta = -\frac{5}{2}$

$\cos\theta = \frac{\sqrt{21}}{5}$ $\sec\theta = \frac{5}{\sqrt{21}}$

$\tan\theta = -\frac{2}{\sqrt{21}}$ $\cot\theta = -\frac{\sqrt{21}}{2}$

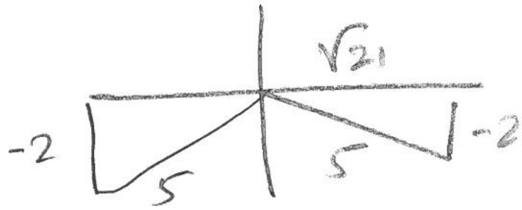
b) $\cos\theta > 0$ ⟹

$\sqrt{25-4} = \sqrt{21}$

1&2 PT 1

4b

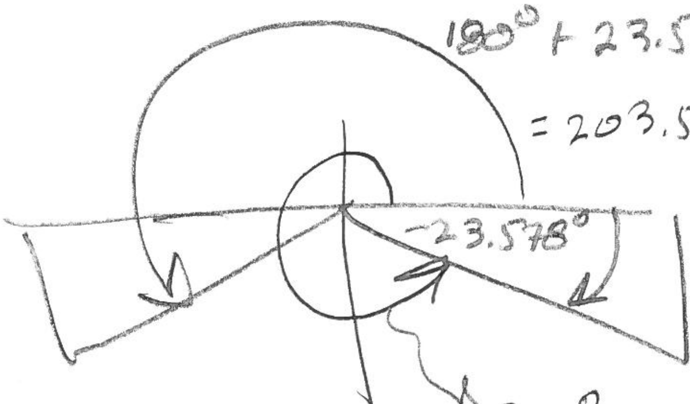
$\csc\theta = -\frac{5}{2} \longrightarrow \sin\theta = -\frac{2}{5}$



$\theta = \arcsin\left(-\frac{2}{5}\right)$

$180^\circ + 23.578^\circ \approx -23.578^\circ$

$= 203.578$



$360^\circ - 23.578^\circ = 336.422^\circ$

So, $\boxed{\begin{array}{l} 336.422^\circ \ \& \ 5.872 \text{ rad} \\ \text{Also } 203.578^\circ \ \& \ 3.553 \text{ rad} \end{array}}$

4c $\{336.422^\circ + 360^\circ n,\ 203.578^\circ + 360^\circ n \mid n \in \mathbb{Z}\}$

OR $\{5.872 + 2n\pi,\ 3.553 + 2n\pi \mid n \in \mathbb{Z}$

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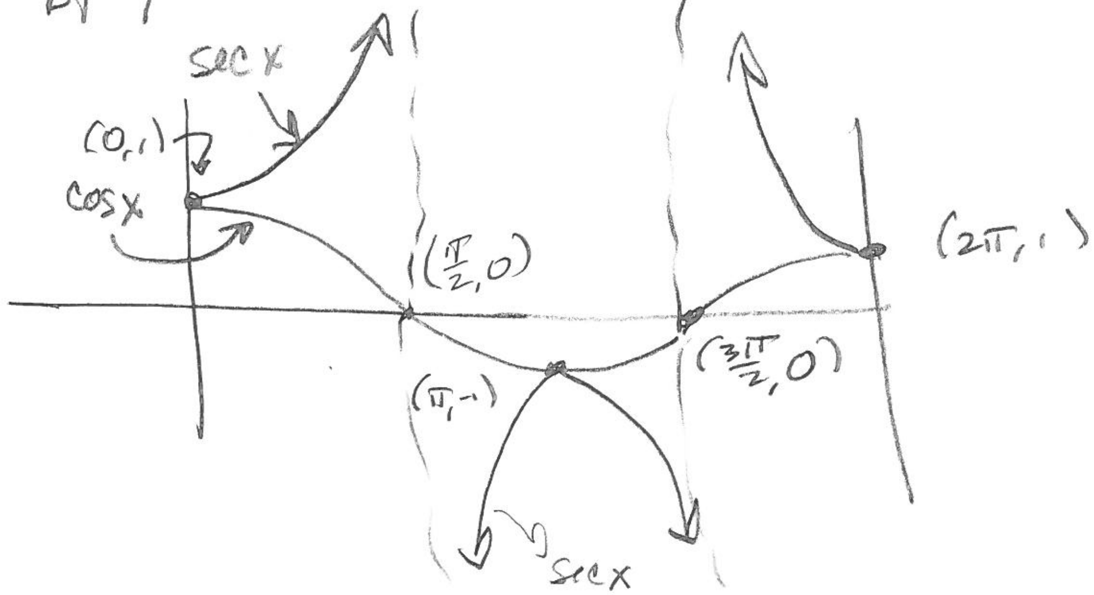
(5)



(6) $\left(\dfrac{1.4 \text{ revs front}}{1 \text{ sec}}\right)\left(\dfrac{4 \text{ revs back sprocket}}{2 \text{ revs front sprocket}}\right) \cdot$

$\cdot \left(\dfrac{1 \text{ rev back wheel}}{1 \text{ rev back sprocket}}\right)\left(\dfrac{(2\pi)(12) \text{ inches}}{1 \text{ rev rear}}\right)\left(\dfrac{1 \text{ ft}}{12 \text{ inches}}\right)$

$\approx 17.59291886 \dfrac{\text{ft}}{\text{s}} \approx \boxed{17.6 \text{ ft/s}}$

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$$f(x) = 13\cos\left(\frac{\pi}{20}(x+7)\right)+12$$

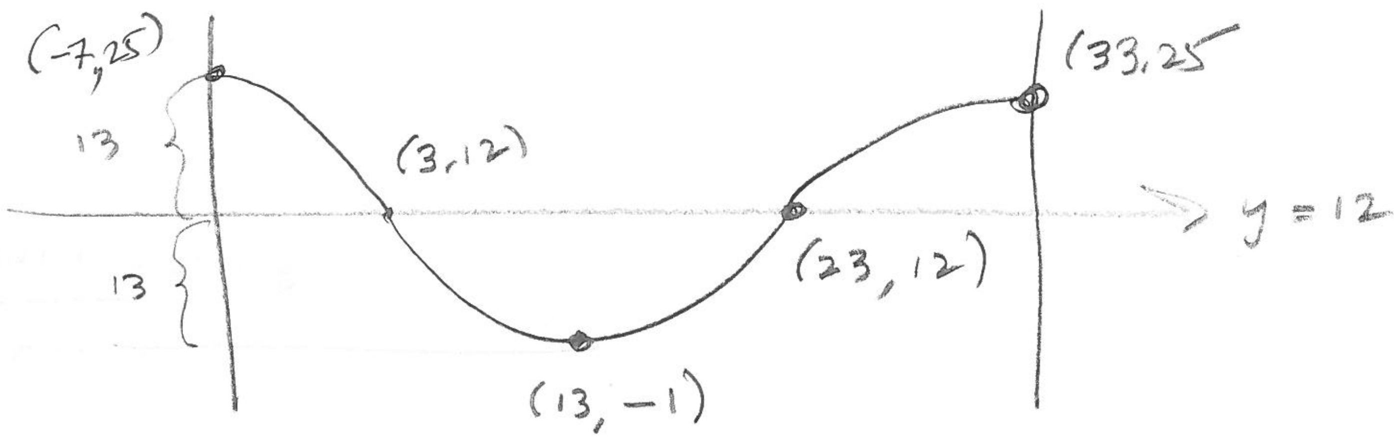
Amp

Start @ $x=-7$

$y=12$ mid

$\frac{\pi}{20}x = 2\pi$ when?

$$x = \frac{20\cdot 2\pi}{\pi} = \boxed{40 = T}$$



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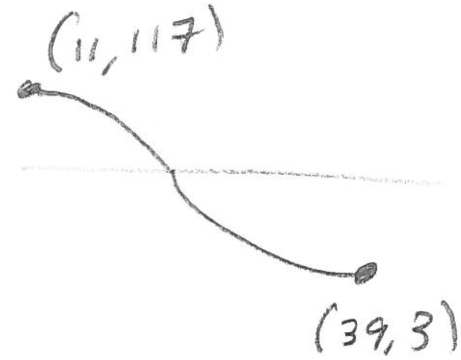
(8) Max of 117 @ t = 11 $a\cos(b(x-c))+d$

min of 3 @ t = 39

$\frac{1}{2}T = 28 \longrightarrow T = 56$

$bx = 2\pi$ when $x = 56$



$56b = 2\pi$

$b = \frac{2\pi}{56} = \frac{\pi}{28}$

$a\cos\left(\frac{\pi}{28}(x-c)\right)+d$

Starts @ t = 11

$a\cos\left(\frac{\pi}{28}(x-11)\right)+d$

Amp : $\frac{\text{High} - \text{Low}}{2} = \frac{117-3}{2} = \frac{114}{2} = 57$

$57\cos\left(\frac{\pi}{28}(x-11)\right)+d$

Mid : $\frac{\text{HIGH} + \text{LOW}}{2} = \frac{117+3}{2} = \frac{120}{2} = 60$

$$\boxed{57\cos\left(\frac{\pi}{28}(x-11)\right)+60}$$

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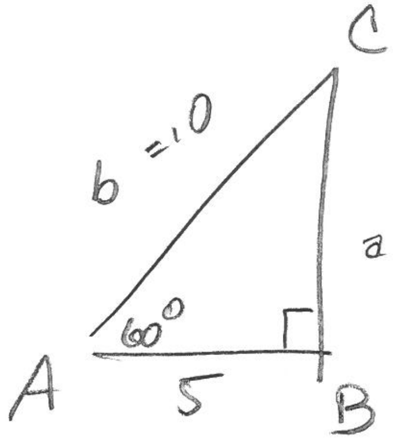
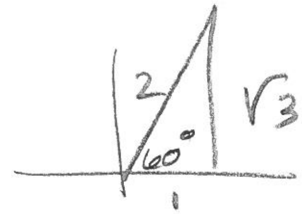
9





$\frac{5}{b} = \cos 60°$

$5 = b\cos 60° = \frac{1}{2}b$

$\boxed{10 = b}$

$\frac{a}{b} = \sin 60° = \frac{\sqrt{3}}{2}$

$a = \frac{\sqrt{3}}{2}b = \frac{\sqrt{3}}{2} \cdot 10 = \boxed{5\sqrt{3} = a}$

$C = 90° - 60° = \boxed{30° = C}$

122 PT 1

10 a $\sin\left(\arctan\left(\frac{12}{5}\right)\right) = \sin\theta$

Arctan $\left(\frac{12}{5}\right)$ pic

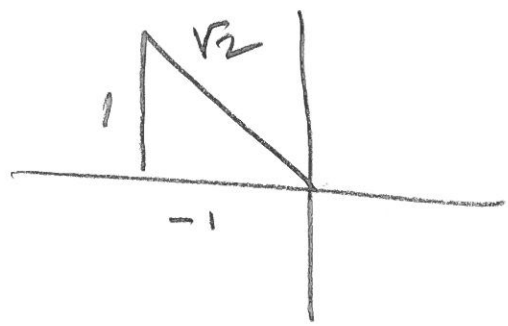
$\sqrt{144+25} = \sqrt{169}$

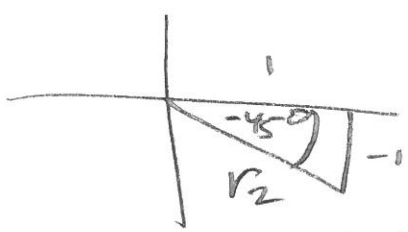
$= 13$

so $\boxed{\sin\theta = \frac{12}{13}}$

b $\arcsin\left(\cos\left(\frac{3\pi}{4}\right)\right)$

$= \arcsin\left(-\frac{1}{\sqrt{2}}\right)$





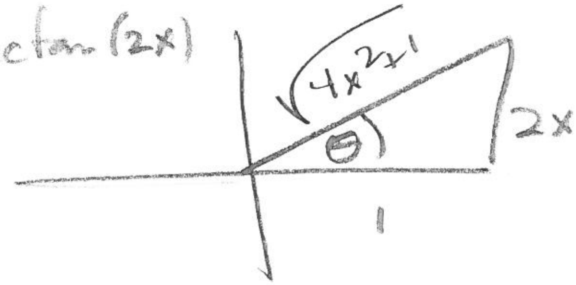
is what arcsine sees

so $\boxed{-45^\circ \text{ OR } -\frac{\pi}{4}}$

122 PT 1

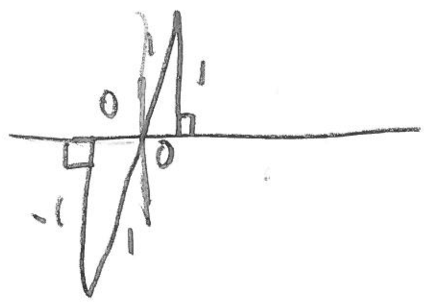
(11) $\cos(\arctan(2x)) = \cos\theta = \boxed{\dfrac{1}{\sqrt{4x^2+1}}}$

$\theta = \arctan(2x)$

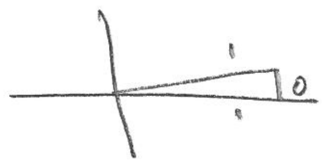


Bonus

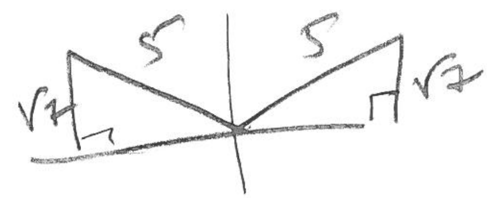
(12) (a) $\cos x = 0$



(b) $\cos x = 1$

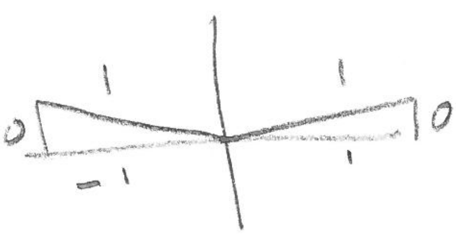


(c) $\sin x = \dfrac{\sqrt{7}}{5}$



(d) $\cos x = \dfrac{5}{\sqrt{7}}$ Unpossible $5 > \sqrt{7}$ = hypotenuse

(e) $\sin x = 0$



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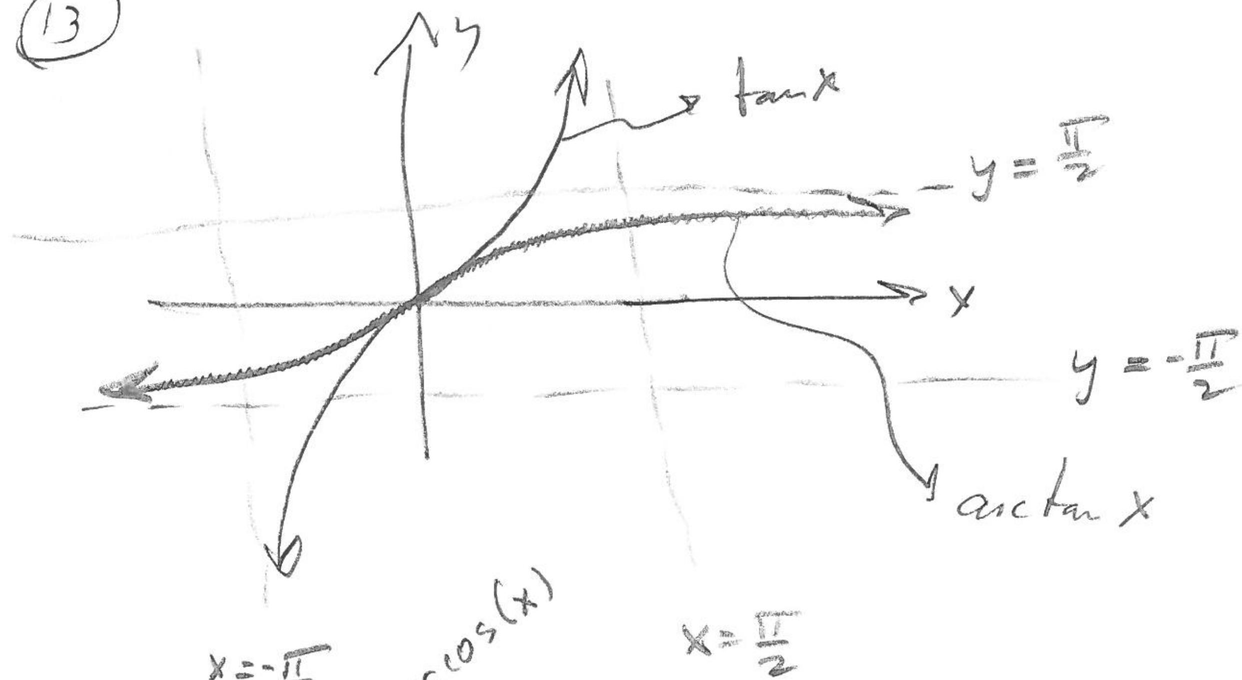
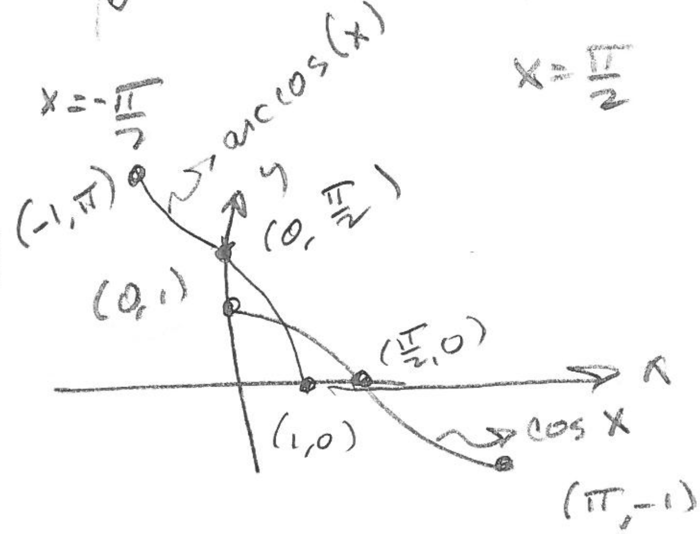
(13)



(14)



(15) Once around circle is 2π radians.

Area of circle is $\pi r^2 = \frac{1}{2}(2\pi) r^2$

$$\boxed{= \frac{1}{2}\theta r^2 = A}$$

circumference is $2\pi r = \boxed{\theta r = s}$