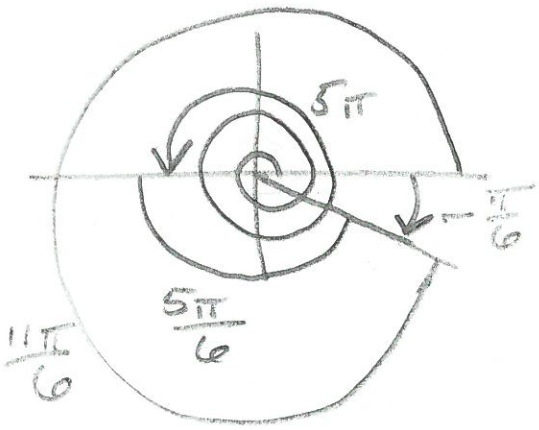
:122 TEST 1 FALL, 2016 10:31

(1) $\theta = \frac{35\pi}{6} = \frac{30\pi}{6} + \frac{5\pi}{6} = 5\pi + \frac{5\pi}{6}$



$-\frac{\pi}{6} = -30^\circ$

OR

$\frac{11\pi}{6} = 330^\circ$

10 pts

(2) (a) $s = r\theta = (6)(234^\circ)\left(\frac{\pi \text{ rad}}{180^\circ}\right)$ 5pts

IF they use '5'

then

204.55525883 x

204.553

$= \frac{1172}{15}\pi \text{ cm} \approx 245.463 \text{ cm}$

(b) $A = \frac{1}{2}r^2\theta = \frac{1}{2}(6)^2\left(\frac{2\pi}{3}\right)$

$= \frac{1}{2}(36)\left(\frac{2\pi}{3}\right) = 12\pi \text{ cm}^2$ 5pts

37.699111184

(3) $\tan\theta = -\frac{2}{3}$

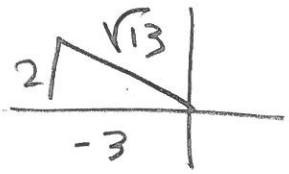
(a)

5pts

(b)

122 TEST 1

(3) (b)



$(-2)^2 + 3^2 = 4 + 9 = 13$

$\sin\theta = \frac{2}{\sqrt{13}}$

$\cos\theta = -\frac{3}{\sqrt{13}}$

$\csc\theta = \frac{\sqrt{13}}{2}$

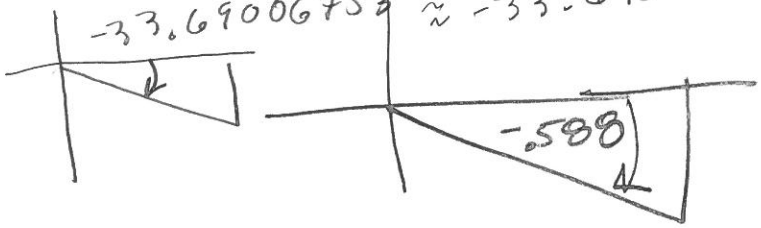
$\sec\theta = -\frac{\sqrt{13}}{3}$

$\cot\theta = -\frac{3}{2}$

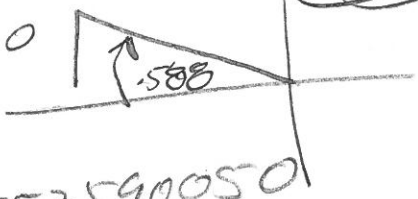
5PTS

(c) $\arctan\left(-\frac{2}{3}\right) \approx -.588002603 6 \text{ rad}$

$-33.690067 53^\circ \approx -33.690^\circ$



, so



5pts

$\pi - .588002603 6 \approx 2.553590050$

So $\theta \approx 2.554 \text{ rad}$

$\theta \approx (2.553590050)\left(\frac{180^\circ}{\pi \text{ rad}}\right)$

$\approx 146.309 9324^\circ \approx 146.310^\circ \approx \theta$

(d) $-.588 + 2n\pi, n \in \mathbb{Z}$

$2.554 + 2n\pi, n \in \mathbb{Z}$

OR

$146.310^\circ + 360n, n \in \mathbb{Z}$

$-33.690 + 360n, n \in \mathbb{Z}$

ALSO LEGIT:

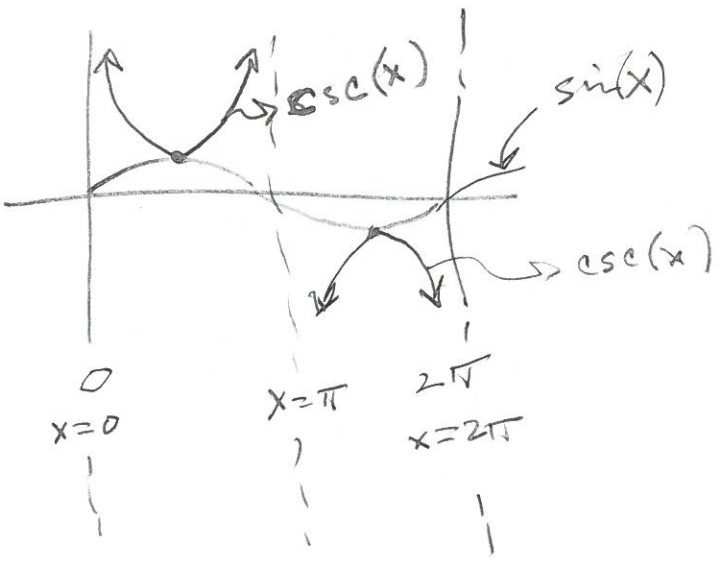
$-.588 + n\pi, n \in \mathbb{Z}$

$146,310^\circ + 180n, n \in \mathbb{Z}$

5pts

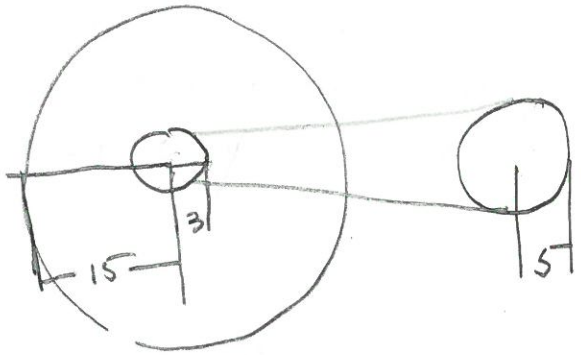
122 TEST 1 FALL '16

(4)



(4 pts)

(5)



$$\left(\frac{1.4 \text{ rev on front}}{\text{second}}\right)\left(\frac{5}{3}\frac{\text{rev on back}}{\text{rev on front}}\right) = \left(\frac{14}{10}\right)\left(\frac{5}{3}\right)\left(\frac{\text{rev back}}{1 \text{ sec}}\right)$$

$$= \frac{7}{3}\frac{\text{rev back}}{\text{sec}}$$

$$\left(\frac{7}{3}\frac{\text{rev back}}{\text{sec}}\right)\left(\frac{(15)(2\pi) \text{ linear in.}}{1 \text{ rev back}}\right)\left(\frac{1 \text{ ft}}{12 \text{ in.}}\right)$$

$$= \frac{(7)(\cancel{15}^{5})(2\pi)}{(\cancel{3})(\cancel{12}^{4})}\frac{\text{ft}}{\text{s}} = \frac{(7)(5)}{6}\pi = \boxed{\frac{35}{6}\pi \frac{\text{ft}}{\text{sec}}}$$

$$\approx 18.32595715 \approx \boxed{18.3 \frac{\text{ft}}{\text{sec}}}$$

$$(\text{Previous})\left(\frac{1 \text{ mi}}{5280 \text{ ft}}\right)\left(\frac{3600 \text{ sec}}{1 \text{ hr}}\right) \approx 12.49497078 \frac{\text{mi}}{\text{hr}}$$

$$\approx \boxed{12.5 \frac{\text{mi}}{\text{hr}}}$$

122 TEST 1 FALL '16.

(5) METHOD 2 - Agonizing step-by-step

(1) convert $\frac{\text{rev}}{\text{sec}}$ to linear speed off front sprocket. $s = r\theta$

(2) convert linear speed of chain to angular speed on the rear sprocket, $\theta = \frac{s}{r}$

(3) convert angular speed to linear speed, using the radius of the rear tire.

(1) $\left(\frac{1.4 \text{ rev front}}{\text{sec}}\right)\left(\frac{(5 \text{ in})(2\pi \text{ rad})}{1 \text{ rev front}}\right) = \left(\frac{7}{5}\right)(10\pi)\frac{\text{in}}{\text{sec}}$

$= \frac{14\pi \text{ in}}{\text{sec}}$ Linear Speed of Chain

(2) $\left(\frac{14\pi \text{ in}}{\text{sec}}\right)\left(\frac{1}{3 \text{ in}}\right) = \frac{14\pi}{3}\frac{\text{radians}}{\text{sec}}$

Angular Speed of rear wheel

$\frac{\text{radians}}{\text{sec}}$

from $\theta = \frac{s}{r}$

(3) Now, use radius on back tire

$s = r\theta$ $\left(\frac{14\pi}{3}\frac{\text{radians}}{\text{sec}}\right)(15 \text{ in radius})\left(\frac{1 \text{ ft}}{12 \text{ in}}\right) = \left(\frac{14\pi}{3}\right)\left(\frac{5}{4}\right)\frac{\text{ft}}{\text{sec}}$

$= \frac{35\pi}{6}\frac{\text{ft}}{\text{sec}} \approx 18.3\frac{\text{ft}}{\text{sec}} \approx \boxed{12.5\frac{\text{mi}}{\text{hr}}}$

Linear Speed of bike.

12.2 TEST 1

(6) $f(x) = 8\sin\left(\frac{\pi}{14}x - \frac{5\pi}{14}\right) + 13$

$= \sin\left(\frac{\pi}{14}(x-5)\right) + 13$

Ampl. 8

$\frac{\pi}{14}x = 2\pi$

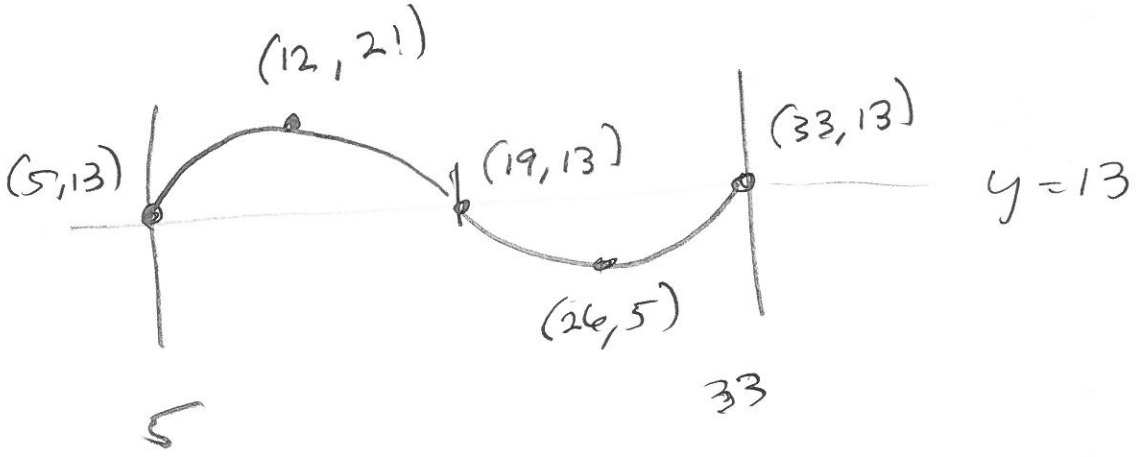
$x = (2\pi)\left(\frac{14}{\pi}\right) = 28$

$x = 28 = T$

start @ $x = 5$

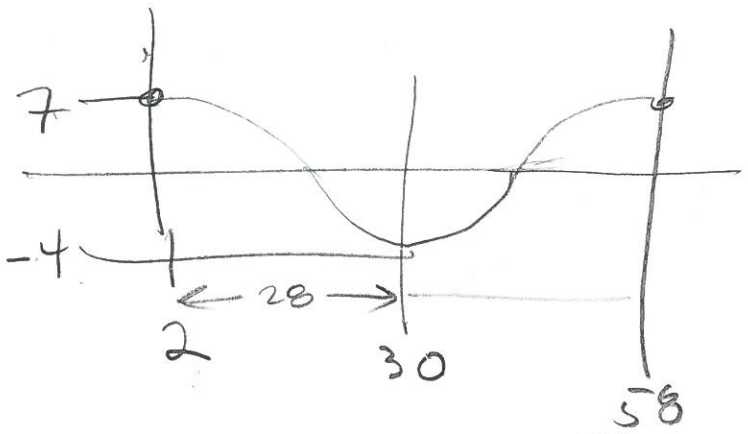
midline $y = 13$

10 pts



122 TEST 1

7



10pts

$$\frac{11}{2}\cos\left(\frac{\pi}{28}(x-2)\right) + \frac{3}{2}$$

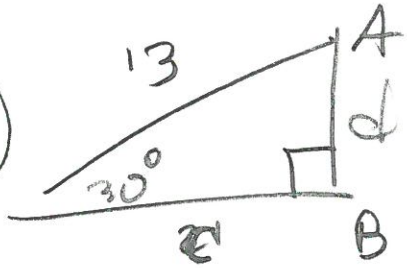
$7 - \frac{3}{2} = \frac{14-3}{2} = \frac{11}{2}$

$T = 56$

$56b = 2\pi$

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

8



$B = 90°$

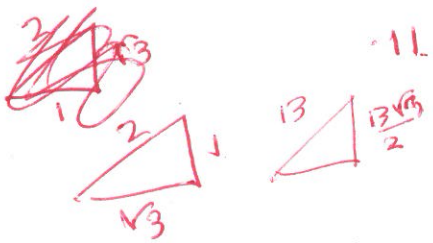
$A = 60°$

5pts

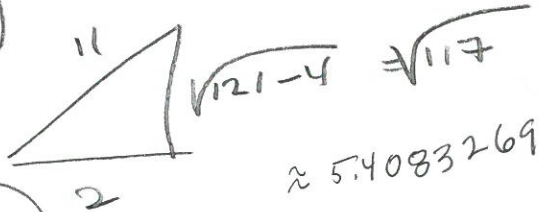
$c = 13\cos(30°)$

$11.25833025 \approx = \frac{13\sqrt{3}}{2} = c$

$d = 13\sin(60°) = \frac{13}{2} = d = 6.5$



9 a) $\tan\left(\arccos\left(\frac{2}{11}\right)\right)$



≈ 5.408326913

$= \frac{\sqrt{117}}{2}$

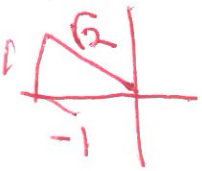
5pts

b) $\arccos\left(\sin\left(\frac{7\pi}{4}\right)\right)$

5pts

$= \arccos\left(\frac{-1}{\sqrt{2}}\right) = \frac{3\pi}{4}$

$\frac{\pi}{4} \approx .7853981634$

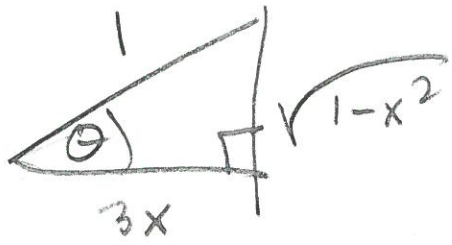


≈ 2.356194449

122 TEST 1

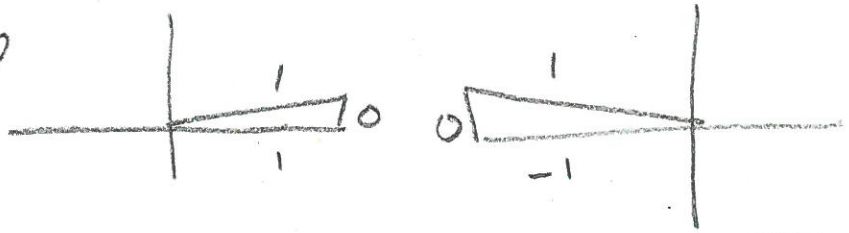
(10) $\sin(\arccos(3x)) = \sqrt{1^2-(3x)^2} = \sqrt{1-9x^2}$

5 pts

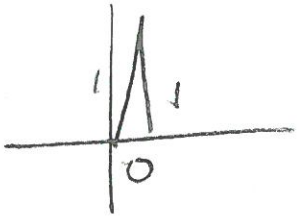


11:26 modulo
10 min chat
Still long ish.

(11) (a) $\sin x = 0$

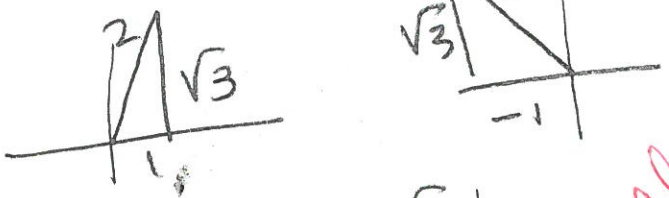


(b) $\sin x = 1$



5 pts

(c) $\sin x = \frac{\sqrt{3}}{2}$



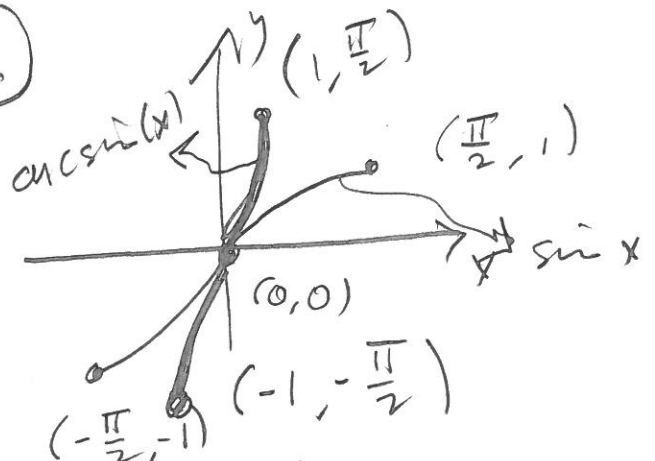
Class: 3rd + drawing enough Δ angles...

(d) $\sin x = \frac{1}{\sqrt{2}}$

(e) $\cos x = 0$

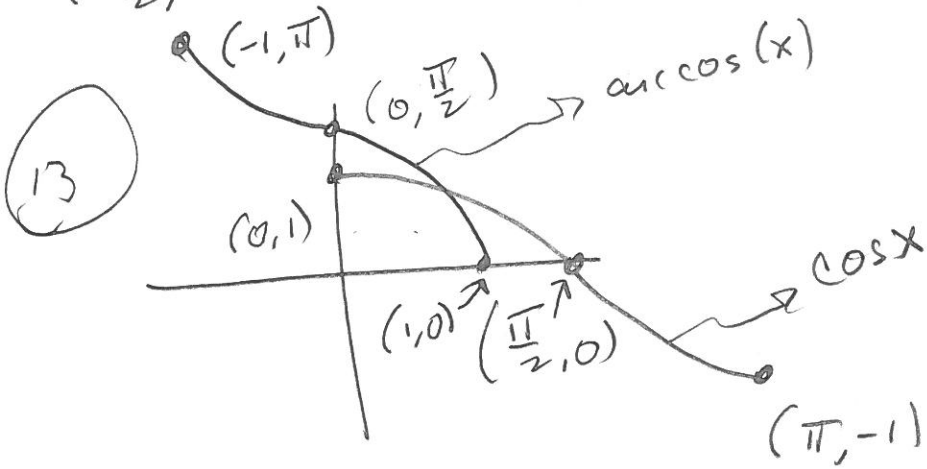
122 TEST 1

12



5B

13



5B

122 TEST 1 FALL '16

(5) $\left(\frac{1.4 \text{ rev}}{\text{sec}}\right)\left(\frac{(5)(2\pi) \text{ linear inches}}{1 \text{ rev}}\right) = \left(\frac{14}{10}\right)(10\pi) = 14\pi \frac{\text{in}}{\text{sec}}$

= chain's speed, in $\frac{\text{in}}{\text{sec}}$.

$$\frac{\left(\frac{\text{arc length}}{\text{sec}}\right)}{\text{radius}} = \text{angular speed in } \frac{\text{radians}}{\text{sec}}$$

$\frac{14\pi \frac{\text{in}}{\text{sec}}}{3 \text{ in}} = \frac{14}{3}\pi \frac{\text{radians}}{\text{sec}}$

Bike's speed: convert radians/sec to linear speed:

$s = r\theta = (15 \text{ in})\left(\frac{14}{3}\pi \frac{\text{radians}}{\text{sec}}\right)$

$= \left((15)\left(\frac{14\pi}{3}\right) \frac{\text{in}}{\text{sec}}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right) = \left(\frac{5}{4}\right)\left(\frac{14}{3}\pi \frac{\text{ft}}{\text{sec}}\right)$

$= \boxed{\frac{35\pi}{6} \frac{\text{ft}}{\text{sec}}} \approx 18.3 \frac{\text{ft}}{\text{sec}}$

$= \left(\frac{35\pi}{6} \text{ ft/sec}\right)\left(\frac{3600 \text{ sec}}{\text{hr}}\right)\left(\frac{1 \text{ mi}}{5280 \text{ ft}}\right)$

$= \left(\frac{35\pi}{6}\right)\left(\frac{15}{22}\right) \frac{\text{mi}}{\text{hr}} = \frac{(35)(5)}{(2)(22)}\pi \frac{\text{mi}}{\text{hr}} = \frac{175}{44}\pi \approx$

$\frac{12.5 \text{ mi}}{\text{hr}}$

15
45
90
180
360
5 20
2 04
1 32
66
22