12. 0/2 points

Determine two coterminal angles (one positive and one negative) for each angle. Give your answers
answers as a comma-separated list.)

(a) $\frac{3\pi}{4}$

$-\frac{5\pi}{4}, \frac{11\pi}{4}$

$\frac{3\pi}{4} + 2\pi = \frac{3\pi + 8\pi}{4} = \frac{11\pi}{4}$

$\frac{3\pi}{4} - 2\pi = \frac{3\pi - 8\pi}{4} = -\frac{5\pi}{4}$

(b) $-\frac{13\pi}{6}$

$-\frac{\pi}{6}, \frac{11\pi}{6}$

$-\frac{13\pi}{6} = -2\pi - \frac{\pi}{6}$ COTERM w/ $\rightarrow \frac{\pi}{6} + 2\pi$

$-\frac{\pi}{6} - 2\pi$

One approach with calculator to find an angle that's coterminal and in $[-2\pi, 2\pi] = [-360^\circ, 360^\circ]$

$-\frac{13\pi}{6} = \left(-\frac{13\pi}{6}\right)\left(\frac{180^\circ}{\pi}\right) = \frac{(-13)(30^\circ)}{(1)(1)} = -390^\circ$

$\frac{-390^\circ}{360^\circ}$

```
                300
390/360
      1.083333333
Ans-1
      .0833333333
Ans*360
                30
```

The remainder or residue modulo 360°

$\Rightarrow$ $-\frac{13\pi}{6}$ C.T. -30°

$-(30^\circ)\left(\frac{\pi}{180^\circ}\right) = -\frac{\pi}{6}$

This is coterminal & negative, I didn't have to subtract 2π or 360°

OR $-30^\circ + 360^\circ = (330^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{11\pi}{6}$

$-30 - 360^\circ = (-390^\circ)\left(\frac{\pi}{180^\circ}\right) = -\frac{13\pi}{6}$

$\frac{37\pi}{6} = \frac{36\pi + \pi}{6} = 3\frac{6\pi}{6} + \frac{\pi}{6}$ C.T. $\frac{\pi}{6}$

3 TIMES AROUND

When you can't do it, yet, you feel stupid,

Then when you CAN do it, it's so easy you feel stupid because it took so long.

If you're doing it right, you always feel stupid. "You just gotta embrace the suck."

zo

Notes and video from last time:

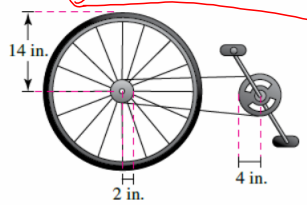
https://harryzaims.com/122/122-spring-21/notes/210114.pdf

https://harryzaims.com/122/122-spring-21/ZOOM-Recordings/210114-lecture.mp4

Jump to about the 27-minute mark in video before things take off.

Jump to 1 hour, 26 minutes for the bicycle's speed question.

The radii of the pedal sprocket, the wheel sprocket, and the wheel of the bicycle in the figure are 4 inches, 2 inches, and 14 inches, respectively. A cyclist pedals at a rate of 1 revolution per second.



(a) Find the speed of the bicycle in feet per second and miles per hour.

24a $\frac{14\pi}{3}$ feet per second

24b $\frac{35\pi}{11}$ mph

From Last Thursday's Overtime!

Dad's step is 3 ft

Junior's step is 2 ft.

1 DAD STEP = $\left(1 \text{ DAD STEP}\right)\left(\frac{3 \text{ JUNIOR STEP}}{2 \text{ DAD STEP}}\right)$

$= \frac{3}{2}$ JUNIOR STEPS.

$\left(\frac{2 \text{ REV FRONT SPROCKET}}{1 \text{ SEC}}\right)\left(\frac{4 \text{ REV REAR SPROCKET}}{2 \text{ REV FRONT SPROCKET}}\right)\left(\frac{2\pi \text{ RADIANS}}{1 \text{ REV REAR}}\right)\left(\frac{14 \text{ in radius}}{\text{on REAR}}\right)$

REV/SEC REAR

r

$\frac{\text{RADIANS}}{\text{SEC}} = \frac{\theta}{\text{SEC}}$

(angular velocity)

ARC LENGTH: $s = r\theta$

$\left(\frac{2 \text{ REV FRONT SPROCKET}}{1 \text{ SEC}}\right)\left(\frac{4 \text{ REV REAR SPROCKET}}{2 \text{ REV FRONT SPROCKET}}\right)\left(\frac{2\pi \text{ RADIANS}}{1 \text{ REV REAR}}\right)\left(\frac{14 \text{ in radius}}{\text{on REAR}}\right)$

$\frac{\text{inches}}{\text{sec}}$ on the ground

$\left(\frac{2 \text{ REV FRONT SPROCKET}}{1 \text{ SEC}}\right)\left(\frac{4 \text{ REV REAR SPROCKET}}{2 \text{ REV FRONT SPROCKET}}\right)\left(\frac{2\pi \text{ RADIANS}}{1 \text{ REV REAR}}\right)\left(\frac{14 \text{ in radius}}{\text{on REAR}}\right)\left(\frac{1 \text{ ft}}{12 \text{ in}}\right)$

is ft/sec!

$\frac{(8\pi)(14)}{12}\frac{\text{ft}}{\text{sec}} = \frac{(2\pi)(14)\text{ft}}{3\ \text{sec}} = \frac{28\pi}{3}\frac{\text{ft}}{\text{sec}}$

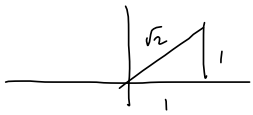
FACT: $\frac{88 \text{ ft}}{\text{sec}} = \frac{60 \text{ mi}}{\text{hr}}$

$\left(\frac{28\pi}{3}\frac{\text{ft}}{\text{sec}}\right)\left(\frac{60 \text{ mi/hr}}{88 \text{ ft/sec}}\right) = \frac{70\pi}{11}$ mi/hr ≈ 19.99195325 mi/hr

EXACT ANSWER!

```
28/3*60/88
      6.363636364
Ans▸Frac
            70/11
Ans*π
      19.99195325
```

S 1.2 #1 $t = \frac{\pi}{4} = 45^\circ$



$\sin\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos\left(\frac{\pi}{4}\right) = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\tan\left(\frac{\pi}{4}\right) = \frac{1}{1} = 1$

A sprinkler on a golf green is set to spray water over a distance of 10 meters and to rotate through an angle of 140°. Draw a diagram that shows the region that can be irrigated with the sprinkler. Find the area of the region. (Round your answer to two decimal places.)

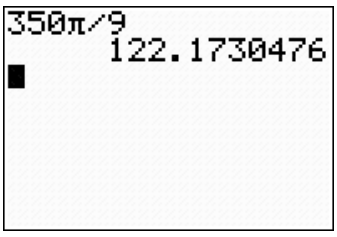
22a [ ] 122.17 m^2

$s = r\theta$ from $C = 2\pi r$

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

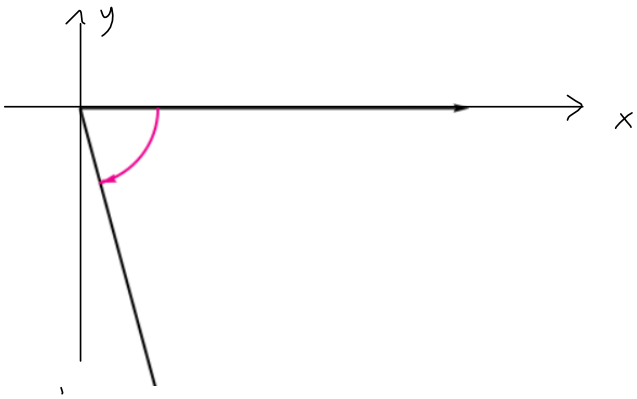
$A = \frac{1}{2}(10\text{ m})^2(140^\circ)\left(\frac{\pi}{180^\circ}\right) = \frac{(50)(140)}{180}\pi\ m^2 = \frac{350\pi}{9}\ m^2$

$\approx 122.1730476\ m^2 \approx \boxed{122.17\ m^2}$

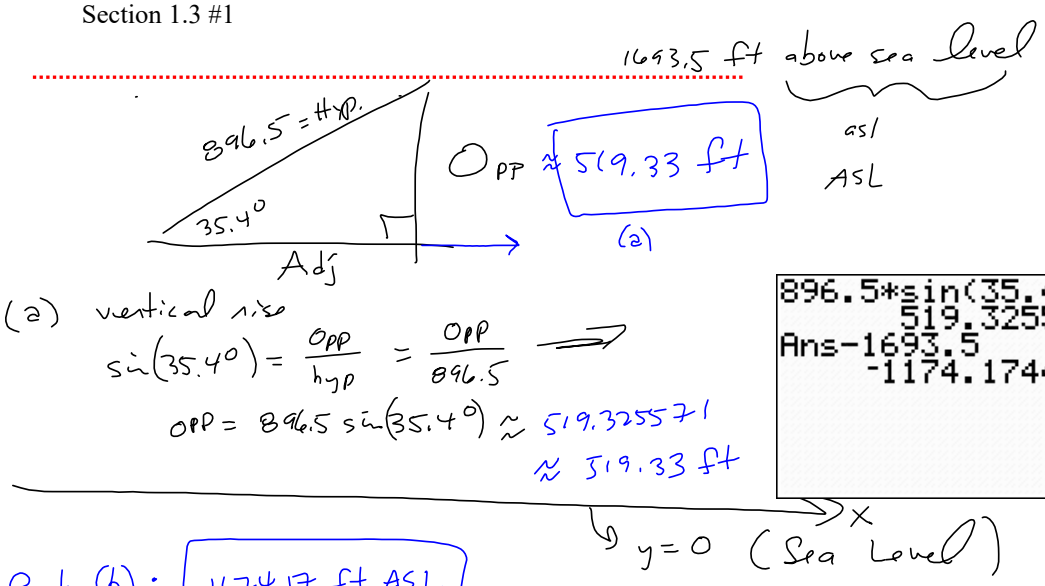


Estimate the number of degrees in the angle.

19a [ ] -75 °

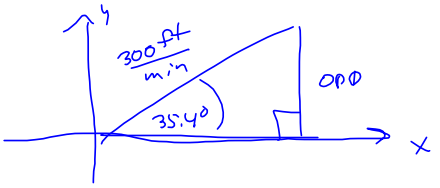


Section 1.3 #1



Part (b): 1174.17 ft ASL

(c) Speed along ramp is $\frac{300\text{ ft}}{\text{min}}$



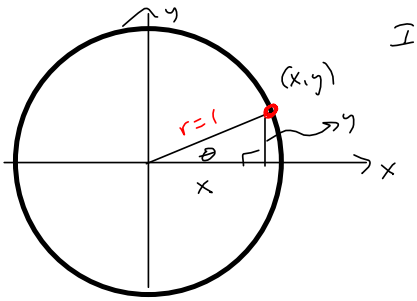
$\frac{Opp}{300\text{ ft/min}} = \sin(35.4°)$

$Opp = 300 \sin(35.4°)$

$\approx 173.78 \frac{\text{ft}}{\text{min}}$ vertical speed.

896.5*sin(35.4)
519.325571
Ans-1693.5
-1174.174429
300sin(35.4
173.7843517

§1.2 IDEA:

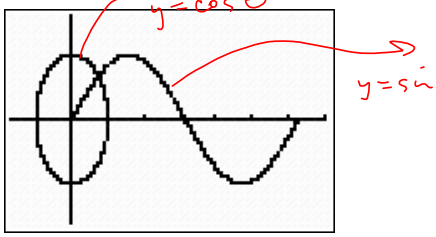


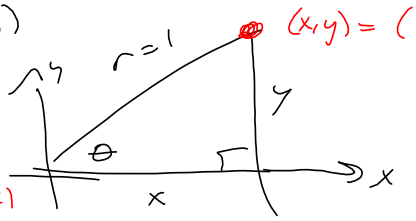
If $r=1$, we're looking at the unit circle!

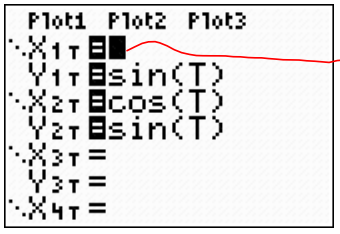
$\sin\theta = \frac{y}{r} = y$

$\cos\theta = \frac{x}{r} = x$

If (x,y) is on the unit circle, then $(x,y) = (\cos\theta, \sin\theta)$, where θ is the angle corresponding to the point (x,y)







"T" is hidden