Type some Sage code below and press Evaluate.

```
1  var('x,p')
2  assume(x>0)
3  assume(p>0)
4  tcu = simplify(p*(x*p^2)^3/sqrt(p*x^2)-1/sqrt(p))
5  show(tcu)
6  show(factor(tcu))
```

Evaluate

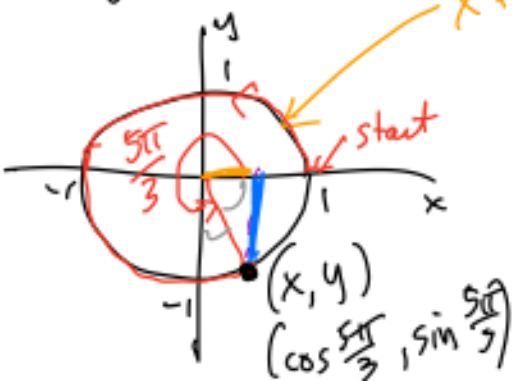
$$p^{\frac{13}{2}}x^2 - \frac{1}{\sqrt{p}}$$

$$\frac{p^7x^2 - 1}{\sqrt{p}}$$

Good way to check homework.

Trig Ex. What is $\sin\left(\frac{5\pi}{3}\right)$?

Unit Circle



$x^2+y^2=1$

angle = arclength ccw around the unit circle starting at (1,0).

$x^2+h^2=1$

$\frac{1}{4}+h^2=1$

$h^2=\frac{3}{4}$

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

$\sin\left(\frac{5\pi}{3}\right) = -\frac{\sqrt{3}}{2}$

$x^2 + x^2 = 1$

$2x^2 = 1$

$x^2 = \frac{1}{2}$

$x = \frac{1}{\sqrt{2}} = \frac{\sqrt{2}}{2}$

$\cos\left(\frac{5\pi}{3}\right) = \frac{1}{2}$

Identities $x^2 + y^2 = 1$

$(\cos\theta, \sin\theta)$ $\sin^2\theta = (\sin\theta)^2$

$\cos^2\theta + \sin^2\theta = 1$

divide by $\cos^2\theta$ →

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

$\Rightarrow 1 + \tan^2\theta = \sec^2\theta$

divide by $\sin^2\theta$ →

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

$\Rightarrow \cot^2\theta + 1 = \csc^2\theta$

Angle Sum

$\sin(A+B) = \sin(A)\cos(B) + \cos(A)\sin(B)$

$\cos(A+B) = \cos(A)\cos(B) - \sin(A)\sin(B)$.

$\sin(2A) = 2\sin(A)\cos(A)$

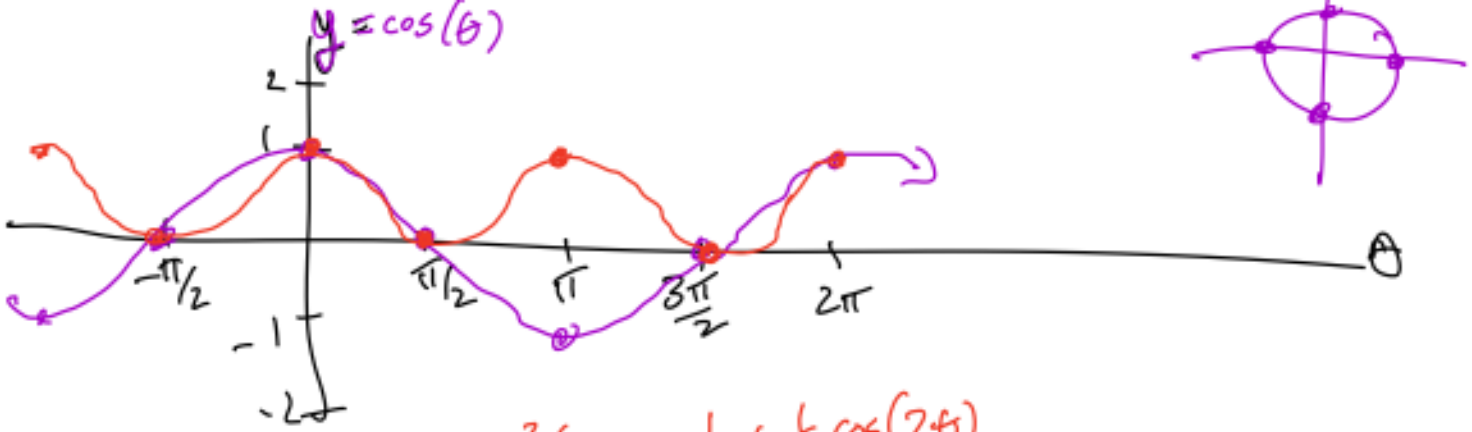
$\cos(2A) = \cos^2(A) - \sin^2(A)$

$= 1 - 2\sin^2(A)$.

$= 2\cos^2(A) - 1$

$\cos^2(A) = \frac{1}{2} + \frac{1}{2}\cos(2A)$

$\sin^2(A) = \frac{1}{2} - \frac{1}{2}\cos(2A)$.



$$y = \cos^2\theta = \frac{1}{2} + \frac{1}{2}\cos(2\theta)$$

Simplify:

① $$\frac{\sin(2\theta)}{\cot(\theta)} = \frac{2\sin(\theta)\cos(\theta)}{\cos\theta/\sin\theta} = 2\sin\theta\cos\theta \cdot \frac{\sin\theta}{\cos\theta}$$

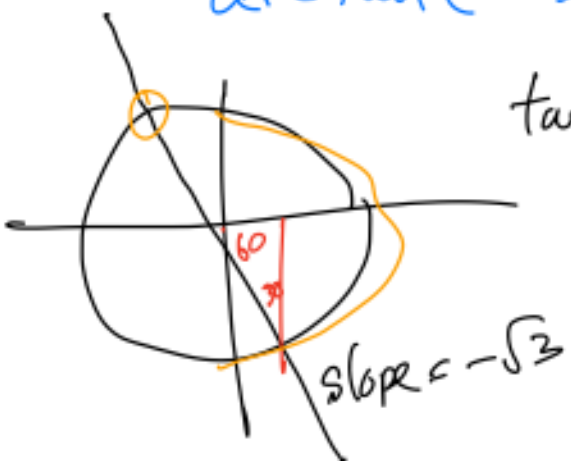
$$= \boxed{2\sin^2\theta} = 2\left(\frac{1}{2} - \frac{1}{2}\cos 2\theta\right)$$

$$= \boxed{1 - \cos(2\theta)}$$

② $$\frac{2\cos^4\theta + 2\sin^2\theta\cos^2\theta - 1}{5\cos(2\theta)}$$

$$= \frac{2\cos^2\theta\underbrace{[\cos^2\theta + \sin^2\theta]}_{1} - 1}{5(2\cos^2\theta - 1)} = \boxed{\frac{1}{5}}$$

$\arctan(-\sqrt{3})$ = angle whose tan is $(-\sqrt{3})$



$\tan = \frac{y}{x}$ = slope of line through $(0,0)$ $\therefore$ $\boxed{\frac{-\pi}{3}}$

$-\frac{\pi}{2} \le \arcsin\theta \text{ or } \arctan\theta \text{ or } \arccos\theta \le \frac{\pi}{2}$

$0 \leq \begin{matrix} \arccos \\ \arctan \\ \operatorname{arcsec} \end{matrix} \leq \pi$