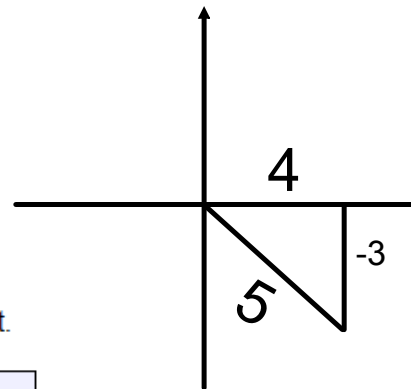


Half-angle identities: Problem type 2

Suppose that $\tan \theta = -\frac{3}{4}$ and $\frac{3\pi}{2} < \theta < 2\pi$.

Find the exact values of $\cos \frac{\theta}{2}$ and $\tan \frac{\theta}{2}$.



Here are the half-angle formulas for sine, cosine, and tangent.

$$\begin{aligned} \sin \frac{u}{2} &= \pm \sqrt{\frac{1 - \cos u}{2}} \\ \cos \frac{u}{2} &= \pm \sqrt{\frac{1 + \cos u}{2}} \\ \tan \frac{u}{2} &= \pm \sqrt{\frac{1 - \cos u}{1 + \cos u}} = \frac{\sin u}{1 + \cos u} = \frac{1 - \cos u}{\sin u} \end{aligned}$$

$$\cos(u) = 4/5$$

$$\cos(u/2) =$$

$$\pm \sqrt{\frac{1 + 4/5}{2}}$$

The minus sign in the expression above is circled in red.

u is in QIV

$u/2$ is in QII

cosine is NEGATIVE in QII

TAN is NEGATIVE in QII

Suppose that $\tan \theta = -\frac{3}{4}$ and $\frac{3\pi}{2} < \theta < 2\pi$.

$$\theta = \tan^{-1}(-3/4) = -36.86\dots$$

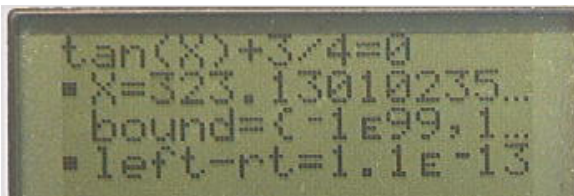
plus 360 is 323 degree

divide by 2 is 161.56

$$\cos(161.56) = -.948\dots \quad = -\text{SQR}(.9)$$

$$\tan x = -3/4$$

math o: solver

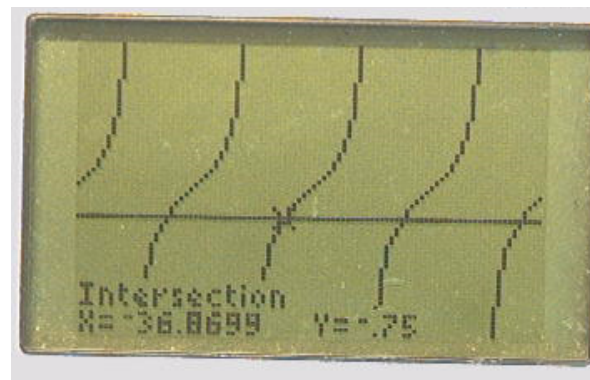


in QIV, have to guess something like 285 degrees

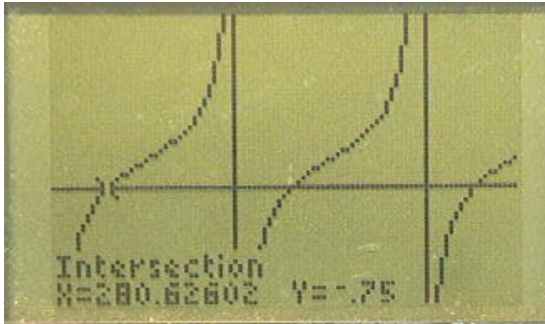
intersection method

$$y_1 = \tan x$$

$$y_2 = -3/4$$



$$\tan(5x) = -3/4$$



$$x = 280.62 \text{ degree}$$

next 316 degrees

difference 36 degrees

answers are

$$280.62\dots + 36n \text{ } n \text{ is an integer}$$

ONLY IN QIV

$$280 + 360n$$

$$316 + 360n$$

$$342 + 360n$$

what is the period of $\tan(5x)$?

period of $\tan(x)$? is 180 degree or π

Period of $\tan(5x)$ is $180/5=36$ or $\pi/5$

