

1. $2\cos x + 1 = 0$

$2\cos x = -1$

$\cos x = -\frac{1}{2}$ **120°** is the smallest angle

2. $\sin x = -1$ $0 \leq x \leq 360$

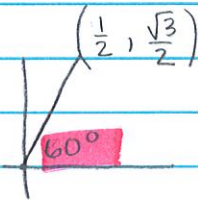
$3\pi/2$ or **270°**

3. pos. acute angle

$2\cos x + 3 = 4$

$2\cos x = 1$

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

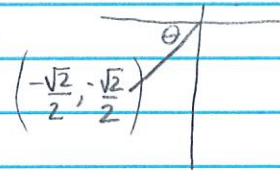


4. QIII $2\tan x - 3 = 3\tan x - 4$

$-2\tan x$ $-2\tan x$

$1 = \tan x$

$\frac{-\sqrt{2}/2}{-\sqrt{2}/2} = \tan x$ $x = \mathbf{225^\circ}$



6 $\sin x = \cos x$

$y = x$

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

45°

5. let $a = \sin x$ then $3a^2 + a - 2 = 0$

$(3a - 2)(a + 1) = 0$

re-substitute

$(3\sin x - 2)(\sin x + 1) = 0$

$3\sin x - 2 = 0$

$\sin x + 1 = 0$

$3\sin x = 2$

$\sin x = -1$

$\sin x = \frac{2}{3}$

$3\pi/2$

2 calc. answers

3 answers

7. $5 \sin x + 4 = 4$

$5 \sin x = 0$

$\sin x = 0$

0, 180, ~~multiples of 180~~

8. $\cos x + 2 = 2$

$\cos x = 0 \quad 0 \leq x \leq 180$

~~90°~~

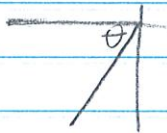
9. $2 \cos x + 1 = 0$

$180 \leq x \leq 270$

$2 \cos x = -1$

$\cos x = -\frac{1}{2}$

~~240°~~



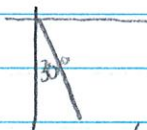
10. $2 \cos x - 1 = 0$

$180 \leq x \leq 360$

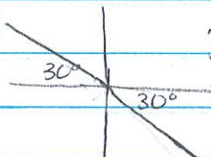
$2 \cos x = 1$

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

~~300°~~



$(-\frac{\sqrt{3}}{2}, \frac{1}{2})$



$(\frac{\sqrt{3}}{2}, -\frac{1}{2})$

11. $\sqrt{3} \tan x + 1 = 0$

$\sqrt{3} \tan x = -1$

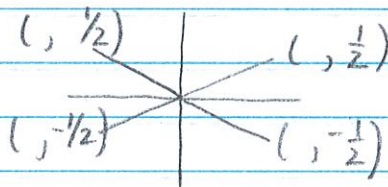
$\tan x = -\frac{1}{\sqrt{3}} = -\frac{1/2}{\sqrt{3}/2}$

$0 \leq x \leq 180$

~~150°~~

12. $\sqrt{\sin^2 x} = \pm \sqrt{\frac{1}{4}}$

$\sin x = \pm \frac{1}{2}$



~~4 angles~~

13. $0 \leq x \leq 270$

$$2\sin^2 x - 5\sin x - 3 = 0$$

let $a = \sin x$ then $2a^2 - 5a - 3 = 0$

$$(a-3)(2a+1) = 0$$

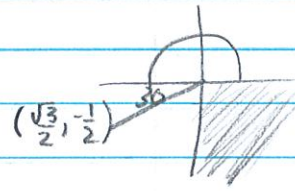
re-substitute

$$(\sin x - 3)(2\sin x + 1) = 0$$

$$\sin x \neq 3 \quad 2\sin x = -1$$

$$\sin x = -\frac{1}{2}$$

$$210^\circ$$



14. let $a = \tan x$ then $3a^2 + a - 2 = 0$

$$(3a-2)(a+1) = 0$$

re-sub.

$$(3\tan x - 2)(\tan x + 1) = 0$$

$$\tan x = \frac{2}{3} \quad \tan x = -1$$

$$\text{once Q I} \quad 3$$

$$\text{once Q II}$$

$$0 \leq x \leq \pi$$

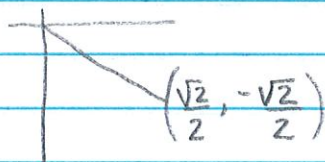
2 answers

15. Q IV $\sin x + \sqrt{2} = -\sin x$

$$\sqrt{2} = -2\sin x$$

$$-\frac{\sqrt{2}}{2} = \sin x$$

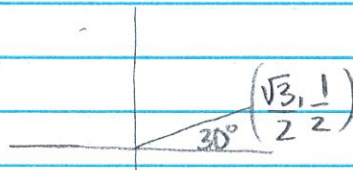
$$315^\circ$$



16. $0 \leq x \leq 180$ $2\cos x = \sqrt{3}$

$$\cos x = \frac{\sqrt{3}}{2}$$

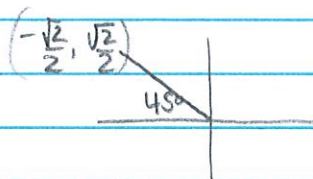
$$30^\circ$$



17. $0 \leq x \leq 180$

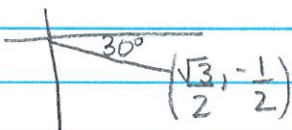
$$\cos x = -\frac{\sqrt{2}}{2}$$

$$135^\circ$$



18. Q IV $\sin x = -\frac{1}{2}$

$$330^\circ$$



Practice 13-6

The Tangent Function

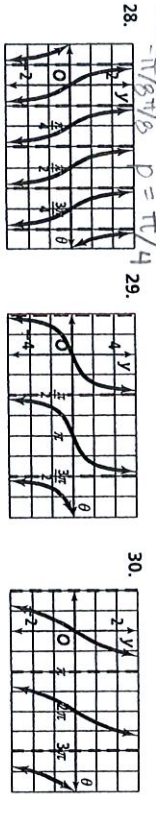
Identify the period and tell where the asymptotes occur, in the interval from 0 to 2π , for each function.

- $y = \tan \theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 2 \tan \frac{\theta}{2}$ $P = \frac{\pi}{2} = \frac{\pi}{1}$ $\alpha = -\frac{\pi}{2}, \frac{\pi}{2}$
- $y = 3 \tan \frac{\theta}{4}$ $P = 2\pi$ $\alpha = -\pi, \pi$
- $y = 4 \tan 2\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -\tan \frac{\pi}{2}\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -2 \tan \pi\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -3 \tan 2\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -4 \tan \theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 0.5 \tan \pi\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 2 \tan \theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -0.5 \tan 2\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 3 \tan \theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 5 \tan \frac{\pi}{2}\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -2.5 \tan \frac{\pi}{2}\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -0.25 \tan 3\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -2.25 \tan \theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = -0.25 \tan \frac{\pi}{3}\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$
- $y = 0.75 \tan 4\theta$ $P = \frac{\pi}{2}$ $\alpha = -\frac{\pi}{4}, \frac{\pi}{4}$

Sketch two cycles of the graph of each function.

- $y = \tan \theta$
- $y = -2 \tan \theta$
- $y = -3 \tan 2\theta$
- $y = 0.5 \tan 2\theta$
- $y = -2 \tan 4\theta$
- $y = -2.25 \tan \theta$
- $y = 2 \tan \theta$
- $y = -0.5 \tan 2\theta$
- $y = 5 \tan \frac{\pi}{2}\theta$
- $y = -2.5 \tan \frac{\pi}{2}\theta$
- $y = -0.25 \tan 3\theta$
- $y = -2.25 \tan \theta$
- $y = -4 \tan 4\pi\theta$
- $y = -5 \tan 3\theta$
- $y = -4 \tan 4\pi\theta$
- $y = 0.75 \tan 4\theta$

Identify the period of each tangent function.



Use the graph of $y = \tan \theta$ to find each value. If the tangent is undefined at that point, write *undefined*.

- $\tan \frac{\pi}{2}$ *undefined*
- $\tan \left(-\frac{\pi}{4}\right) = -1$ (OI)
- $\tan \left(-\frac{3\pi}{4}\right) = 1$ (OIII)
- $\tan \frac{3\pi}{2}$ *undefined*
- $y = 200 \tan x$
- $y = -75 \tan \left(\frac{1}{4}x\right)$
- $y = -50 \tan x$

