Exercise 1. / 3

Give the exact value of

$\cos\left(\frac{\pi}{2}\right) = 0$ (90°) $\tan(-45°) = -1$

$\sin\left(\frac{2\pi}{3}\right) = \sqrt{3}/2$ (120°) $\cos(585°) = -\frac{\sqrt{2}}{2}$ (225)

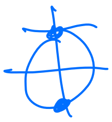
Exercise 2. / 4

Determine the exact value of $\cos(x)$, $\tan(x)$ and $\cot(x)$ given that $\sin(x) = -\frac{3}{5} = -0.6$ and that the point P_x is in quadrant IV. *Indicate your computations.*

$\cos^2(x) = 1 - 0{,}36 = 0{,}64$ $\cos(x) = \sqrt{0{,}64} = 0{,}8$ $\tan(x) = \frac{-0{,}6}{0{,}8} = -\frac{3}{4}$ $\cot(x) = -\frac{4}{3}$

Exercise 3. / 4

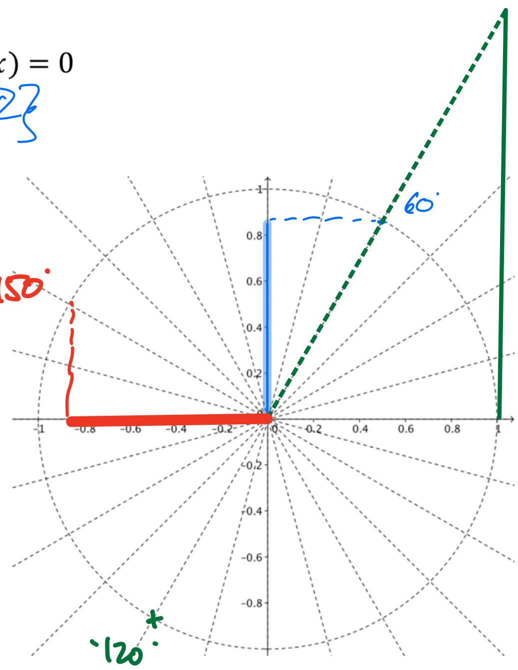
a) Give in radians all the solutions of the equation $\cot(x) = 0$



$x \in \left\{\frac{\pi}{2} + k\cdot\pi,\ k \in \mathbb{Z}\right\}$

b) Clearly represent on the following circle with different colors :

$\sin(60°)$, $\cos(150°)$ and $\tan(-120°)$

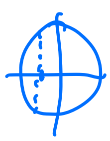


Exercise 4. / 6

$k \in \mathbb{Z}$

Solve the equations a) $2 + 4\cos(3x) = 0$ and b) $\sin(x - 10°) = \sin(-2x)$

a) $\cos(3x) = -\frac{2}{4} = -0{,}5$



$3x \in \{120° + k\cdot 360°\}$
$\cup \{240° + k\cdot 360°\}$

$x \in \{40° + k\cdot 120°\} \cup \{80° + k\cdot 120°\}$

b) $x - 10° = -2x + k\cdot 360°$

$3x = 10° + k\cdot 360°$

$x \in \{3{,}3° + k\cdot 120°\} \cup$

and $x - 10° = 180° - (-2x) + k\cdot 360°$

$x - 10° = 180° + 2x + k\cdot 360°$

$-x = 190° + k\cdot 360°$

$x \in \{-190° + k\cdot 360°\}$

Exercise 5. / 5

a) Determine the acute angle between the y-axis and the line passing through the points $(-2; 5)$ and $(3; -1)$.

b) Give the equation of the steeper line that passes through the point $(2; 1)$ and forms an angle of $20°$ with the line $y = x$.

a) $\Delta x = 3-(-2) = 5 \quad \Delta y = -1-5 = -6$

Slope $= \frac{\Delta y}{\Delta x} = \frac{-6}{5} = -1,2$

Angle with x-axis:

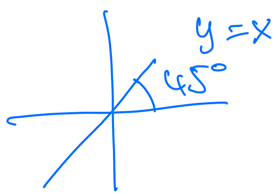
$\tan^{-1}(-1,2) \approx -50,19°$

The angle with the y-axis

So $50,19°$

is $90° - 50,19° \approx \underline{39,81°}$

b)



20° degrees more

So $65°$

$m = \tan(65°) \approx 2,14$

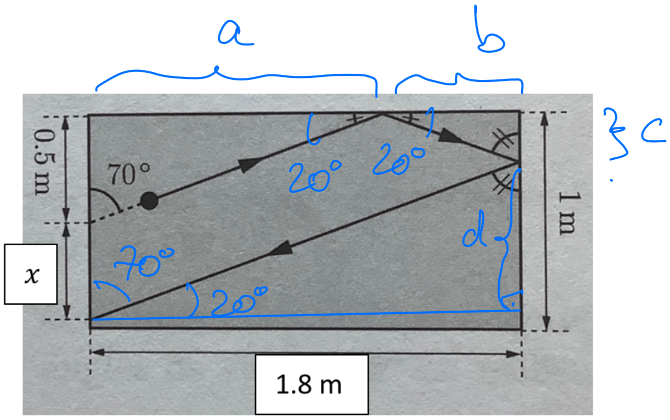
$y = 2,14 \cdot x + h$

A: $1 = 2,14 \cdot 2 + h = 4,28 + h \quad h = -3,28$

$\underline{y = 2,14x - 3,28}$

Exercise 6. / 4

Here is a top view of a billard table.
Determine with justifications the measure of the length x on the following situation.



$\tan(70°) = \frac{a}{0{,}5}$ $a \cong 1{,}37$

$b = 1{,}8 - a \cong 0{,}43$

$\tan(20°) = \frac{c}{b}$ $c \cong 0{,}16$

$\tan(20°) = \frac{d}{1{,}8}$ $d \cong 0{,}66$

$x = \underbrace{c + d}_{0{,}81} - 0{,}5 \cong \underline{0{,}31 \text{ m}}$

Exercise 7. / 3

Use the basic trigonometric relations to show that

$$\tan^2(x) + \tan(x) \cdot \underbrace{\cot(x)}_{\frac{1}{\tan(x)}} = \frac{1}{\underbrace{1 - \sin^2(x)}_{\cos^2(x)}}$$

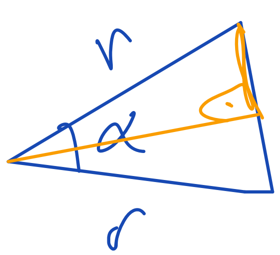
$$\tan^2(x) + \tan(x) \cdot \frac{1}{\tan(x)} = \tan^2(x) + 1 \overset{?}{=} \frac{1}{\cos^2(x)}$$

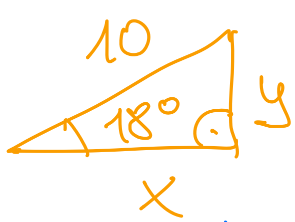
Yes!

Exercise 8. / 4

Determine the area of a regular 10-gon inscribed in a circle with radius 10.
Justify and round your answer to two digits.

$\alpha = \frac{360°}{10} = 36°$





$\sin(18°) = \frac{y}{10}$ $y = 10 \cdot \sin(18°) \cong 3{,}09$

$\cos(18°) = \frac{x}{10}$ $x = 10 \cdot \cos(18°) \cong 9{,}51$

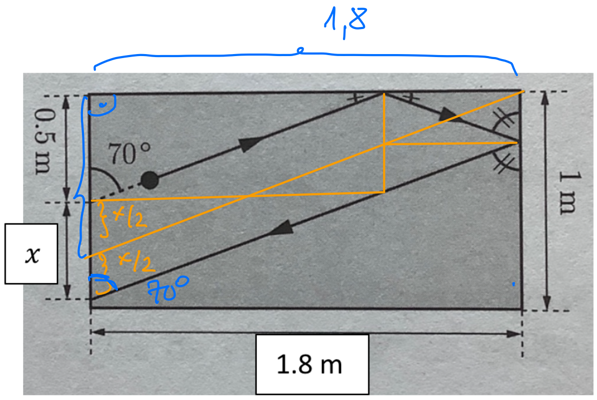
Area $= 10 \cdot x \cdot y$

$\cong 293{,}89$

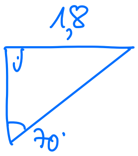
Ex 6 - Simple version A

Exercise 6. / 4

Here is a top view of a billard table.
Determine with justifications the measure of the length x on the following situation.



$0{,}5 + \frac{x}{2}$



$$\tan(70°) = \frac{1{,}8}{0{,}5 + \frac{x}{2}}$$

$$0{,}5 + \frac{x}{2} = \frac{1{,}8}{\tan(70°)} \cong 0{,}655$$

$$\frac{x}{2} \cong 0{,}155$$

$$x \cong 0{,}31 \text{ m}$$