

- (1) If $2 \tan \theta + 1 = 3$, with $\sin \theta < 0$, calculate the value of θ .

$$2 \tan \theta = 2$$

$$\tan \theta = \frac{2}{2} = 1 \quad [RA = 45^\circ]$$

$$\therefore \text{3}^{\text{rd}} \text{ Q: } [\tan \theta > 0 \text{ and } \sin \theta < 0]$$

$$\therefore \theta = 180^\circ + 45^\circ + k \cdot 360^\circ$$

$$\theta = 225^\circ + k \cdot 360^\circ$$

$$\text{with } k \in \mathbb{Z}$$

- (2) (a) Determine B if $\cos(2B + 10^\circ) = -0,747$. [Correct to 2 decimals.]

- (b) Then determine the value(s) of B for $B \in [-180^\circ; 360^\circ]$.

$$(a) \quad \cos(2B + 10^\circ) = -0,747$$

2^{nd} Q:

$$RA = 41,66\dots$$

3^{rd} Q:

$$2B + 10^\circ = 180^\circ - 41,66 + k \cdot 360^\circ$$

$$2B + 10^\circ = 180^\circ + 41,66\dots + k \cdot 360^\circ$$

$$2B = 138,33\dots - 10^\circ + k \cdot 360^\circ$$

$$2B = 221,66\dots - 10^\circ + k \cdot 360^\circ$$

$$2B = 128,33\dots + k \cdot 360^\circ$$

$$2B = 211,66\dots + k \cdot 360^\circ$$

$$B = 64,17^\circ + k \cdot 180^\circ$$

$$B = 105,83^\circ + k \cdot 180^\circ$$

$$k \in \mathbb{Z}$$

(b) Substitute k with 0; 1; -1;

$$\therefore B \in \{-115,83^\circ; -74,17^\circ; 64,17^\circ; 105,83^\circ; 244,17^\circ; 285,83^\circ\}$$

- (3) Solve for θ if $\sin 2\theta + 3 = 3,104$ where $0^\circ < \theta < 360^\circ$. [Correct to 3 decimals.]

$$\sin 2\theta = 3,104 - 3$$

$$\sin 2\theta = 0,104$$

1st Q:

$$RA = 5,969 \dots$$

2nd Q:

$$2\theta = 5,969 \dots + k \cdot 360^\circ$$

$$2\theta = 180^\circ - 5,969 \dots + k \cdot 360^\circ$$

$$\theta = 2,985^\circ + k \cdot 180^\circ$$

$$2\theta = 174,030 \dots + k \cdot 360^\circ$$

$$k \in \mathbb{Z}$$

$$\theta = 87,015^\circ + k \cdot 180^\circ$$

$\therefore$ Substitute k with $0; 1; -1 \dots$

$$\therefore \theta \in \{2,985^\circ; 87,015^\circ; 182,985^\circ; 267,015^\circ\}$$

- (4) If $2 \cos(A + 11^\circ) = \sqrt{3}$ with $A \in (90^\circ; 360^\circ)$, calculate the value of $\sin\left(\frac{A}{2} - 35^\circ\right)$ correct to 3 decimals.

$$2 \cos(A + 11^\circ) = \sqrt{3}$$

$$\cos(A + 11^\circ) = \frac{\sqrt{3}}{2} \quad RA = 30^\circ$$

4th Q:

$$A + 11^\circ = 360^\circ - 30^\circ + k \cdot 360^\circ$$

$$A + 11^\circ = 330^\circ + k \cdot 360^\circ$$

$$A = 319^\circ + k \cdot 360^\circ \text{ with } k \in \mathbb{Z}$$

$$\therefore A = 319^\circ \text{ (Subst. } k=0) \Rightarrow \therefore \sin\left(\frac{A}{2} - 35^\circ\right)$$

$$= \sin\left(\frac{319^\circ}{2} - 35^\circ\right)$$

$$= 0,82412 \dots$$

$$\approx 0,824$$

(5) Determine P , without using a calculator, if $-90^\circ < P < 180^\circ$:

$$3 \tan^2 P = \sin 330^\circ \cdot \cos 180^\circ + \sin^2 135^\circ \times \tan 225^\circ$$

$$3 \tan^2 P = \sin(360^\circ - 30^\circ) \cdot \cos 180^\circ + \sin^2(180^\circ - 45^\circ) \times \tan(180^\circ + 45^\circ)$$

$$= (-\sin 30^\circ) \cdot \cos 180^\circ + (\sin 45^\circ)^2 \times (\tan 45^\circ)$$

$$= \left(-\frac{1}{2}\right) \left(-\frac{1}{1}\right) + \left(\frac{\sqrt{2}}{2}\right)^2 \times \left(\frac{\sqrt{2}}{\sqrt{2}}\right)$$

$$= \frac{1}{2} + \left(\frac{1}{2}\right) (1)$$

$$= \frac{1}{2} + \frac{1}{2}$$

$$3 \tan^2 P = 1$$

$$\tan^2 P = \frac{1}{3}$$

$$\tan P = \pm \frac{1}{\sqrt{3}} \left(\frac{y}{x}\right)$$

$$RA = 30^\circ$$

$$1^{st} Q: P = 30^\circ + k \cdot 360^\circ \quad k \in \mathbb{Z}$$

$$2^{nd} Q: P = 180^\circ - 30^\circ + k \cdot 360^\circ = 150^\circ + k \cdot 360^\circ$$

$$3^{rd} Q: P = 180^\circ + 30^\circ + k \cdot 360^\circ = 210^\circ + k \cdot 360^\circ$$

$$4^{th} Q: P = 360^\circ - 30^\circ + k \cdot 360^\circ = 330^\circ + k \cdot 360^\circ$$

or

$$1^{st} (+): P = 30^\circ + k \cdot 180^\circ \quad k \in \mathbb{Z}$$

$$2^{nd} (-): P = 180^\circ - 30^\circ + k \cdot 180^\circ = 150^\circ + k \cdot 180^\circ$$

$$\therefore P \in \{-30^\circ; 30^\circ; 150^\circ\}$$