

## Exercices : les équations trigonométriques

### Exercice 1

Résoudre les équations élémentaires suivantes et donner les valeurs principales.

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

16)  $3 \sin 2x = 1$

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

17)  $\sin 4x + \sin x = 0$

3)  $\operatorname{tg} x = -1$

18)  $\operatorname{tg} \left(3x + \frac{\pi}{6}\right) = \operatorname{tg} \left(\frac{2\pi}{3} - 2x\right)$

4)  $2 \sin 2x + 1 = 0$

19)  $\cos 2x = -\cos \left(x - \frac{\pi}{3}\right)$

5)  $\operatorname{tg} 4x - \sqrt{3} = 0$

20)  $\sin \left(3x - \frac{\pi}{4}\right) = \sin \left(\frac{\pi}{6} - x\right)$

6)  $2 \cos^2 x = 1$

21)  $\sin 2x = \cos x$

7)  $\sin 3x = 5$

22)  $\sin \left(2x + \frac{\pi}{3}\right) = \cos \left(x - \frac{\pi}{4}\right)$

8)  $\cos x = -\frac{2}{7}$

23)  $\sin \left(3x + \frac{\pi}{6}\right) - \cos \left(x - \frac{\pi}{3}\right) = 1$

9)  $\sin 3x \operatorname{cosec} 2x = -1$

24)  $\operatorname{tg} 2x = \operatorname{cotg} x$

10)  $\operatorname{tg} x = -\frac{13}{4}$

25)  $\operatorname{tg} 4x \operatorname{cotg} 2x = -1$

11)  $2 \cos 5x = -\sqrt{3}$

26)  $\operatorname{tg} x = 3 \operatorname{cotg} x$

12)  $2 \cos \left(3x + \frac{\pi}{2}\right) + 1 = 0$

27)  $\operatorname{tg} 3x + \operatorname{cotg} x = 0$

13)  $2 \sin \left(\frac{\pi}{6} - 2x\right) = \sqrt{3}$

28)  $\sin 3x = \cos \left(\frac{\pi}{3} - x\right)$

14)  $3 \operatorname{tg} \left(2x - \frac{\pi}{6}\right) = -\sqrt{3}$

29)  $\cos 3x + \sin x = 0$

15)  $\operatorname{tg}^2 x = 3$

30)  $\operatorname{cotg}^2 x = 1$

Exercice 2

Résoudre les équations se ramenant à une équation du second degré et donner les valeurs principales.

1)  $2 \cos^2 x - \cos x - 1 = 0$

6)  $\cos 2x - \cos x - 1 = 0$

2)  $2 \cos^2 x + 5 \cos x + 2 = 0$

7)  $\operatorname{tg}^2 x - 5 \operatorname{tg} x + 6 = 0$

3)  $12 \cos^2 x - 8 \sin x = 5$

8)  $3 \operatorname{tg}^2 x - 4\sqrt{3} \operatorname{tg} x + 3 = 0$

4)  $12 \cos^2 x + 8 \sin^2 x = 11$

9)  $\operatorname{sec}^2 x - 4 \operatorname{tg} x + 2 = 0$

5)  $2 \cos 2x + 1 + 3 \cos x = 0$

10)  $3 \operatorname{cotg}^2 x - 2\sqrt{3} \operatorname{cotg} x = 3$

Exercice 3

Résoudre les équations suivantes grâce aux formules trigonométriques et donner les valeurs principales.

1)  $\sin x + \sin 3x = \cos x$

6)  $\cos 3x - \cos 5x = \sin 6x + \sin 2x$

2)  $\sin 2x + \sin 4x - \sin 3x = 0$

7)  $\sin 3x + \sin x = \sin 2x$

3)  $\cos x - \cos 2x + \cos 3x = 0$

8)  $\sin 2x - 2 \cos^2 x = 0$

4)  $\sin 3x - \sin 2x - 2 \cos \frac{5x}{2} = 0$

9)  $\cos x + \cos 5x = \cos 3x + \cos 7x$

5)  $\sin x + \sin 3x = 1 + \cos 2x$

10)  $\sin 4x \cos x = \sin x \cos 4x$

Exercice 4

Résoudre les équations homogènes en  $\sin x$  et  $\cos x$ , puis donner les valeurs principales.

1)  $\sin^4 x + 2 \sin^2 x \cos^2 x - 3 \cos x \sin^3 x = 0$

2)  $3 \cos^4 x - 3 \cos^2 x \sin^2 x + 2\sqrt{3} \sin x \cos^3 x = 0$

3)  $\sin^3 x + \cos^3 x = \sin^2 x \cos x + \sin x \cos^2 x$

4)  $4 \sin^4 x = 24 \cos^4 x + 4 \sin^2 x \cos^2 x$

5)  $4 \sin^2 x - 11 \sin x \cos x + 6 \cos^2 x = 0$

6)  $2 \cos^2 x - 3 \sin x \cos x = 0$

7)  $2 \sin^2 x - 11 \sin x \cos x + 4 = 0$

8)  $\sin^4 x + \cos^4 x = \frac{2}{3}$

9)  $\sin^3 x - \sin^2 x \cos x + 3 \sin x \cos^2 x = 0$

10)  $\sin^4 x + 2 \cos^4 x - 3 \sin^2 x \cos^2 x = 0$

### Exercice 5

Résoudre les équations linéaires, puis donner les valeurs principales.

1)  $\cos x + \sqrt{3} \sin x = \sqrt{2}$

6)  $3 \cos x + 2 \sin x = 1$

2)  $\sqrt{3} \cos x + 3 \sin x = 3$

7)  $\sin x - 4 \cos x = 4$

3)  $\cos x + \sin x = \frac{\sqrt{2}}{2}$

8)  $\sqrt{3} \sin x + 3 \cos x + \sqrt{6} = 0$

4)  $\cos 2x + \sin 2x = \sqrt{2}$

9)  $2 \cos \left(2x + \frac{\pi}{2}\right) - 3 \sin \left(2x + \frac{\pi}{2}\right) = 0$

5)  $3 \cos x + 2 \sin x = 2$

10)  $\cos x + \sin x = -1$

### Exercices récapitulatifs

1)  $\cos x + \sqrt{3} \sin x = 1$

7)  $2 \cos^3 x - 3 \sin^2 x \cos x = 0$

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

8)  $3 \cos \left(x + \frac{\pi}{6}\right) - 4 \sin \left(x + \frac{\pi}{6}\right) = 0$

3)  $2 \sin^2 x - 4 \sin x \cos x - 4 \cos^2 x = -4$

9)  $\cos 2x + \sin x = 0$

4)  $\cos 2x + \sin^2 x = \frac{3}{4}$

10)  $\sin 4x + 2 \sin 3x (\cos 3x + \cos x) = 0$

5)  $\operatorname{tg}^2 x - \sqrt{3} \operatorname{tg} x = 0$

11)  $\sin 2x + \cos 3x = 0$

6)  $\sin x + \sin 3x + \sin 9x - \sin 5x = 0$

12)  $\operatorname{tg} \left(3x + \frac{\pi}{6}\right) = 1$

13)  $\sin 4x - 4 \sin x \cos^2 x = 0$

22)  $\sin^2 x - \cos 2x + 1 = 0$

14)  $\sin x \cos 2x \sin 3x = 0$

23)  $\cos 2x = \sin \left(x - \frac{\pi}{4}\right)$

15)  $\cos^4 x + \sin^4 x = 4 \cos^2 x \sin^2 x$

24)  $1 - \cos^2 2x = \sin 2x \cos x$

16)  $\cos 2x = -1$

25)  $\cos 2x + \sqrt{3} \cos \left(2x + \frac{\pi}{2}\right) = \sqrt{3}$

17)  $\cos x + \cos 3x = \sin 6x + \sin 2x$

26)  $\cos 2x + \cos 6x = 1 + \cos 8x$

18)  $\cos x + \sin x = \sqrt{2}$

27)  $3 \sin x + 2 \cos x = 0$

19)  $-6 \cos x + 8 \sin x = 3$

28)  $\cos^2 x - \sin^3 x = \cos x$

20)  $\operatorname{tg} x = \frac{\operatorname{tg} 2x + 1}{\operatorname{tg} 2x - 1}$

29)  $\sin \left(4x - \frac{\pi}{5}\right) \cos \left(2x + \frac{\pi}{15}\right) = \sin \left(2x + \frac{\pi}{15}\right) \cos \left(4x - \frac{\pi}{5}\right)$

21)  $\frac{1 - \sin x}{1 + \sin x} = \operatorname{tg}^2 2x$

30)  $2(1 + \cos 2x) = \sin x$