LDDR Niveau 1 : TE 4 Trigo

EXERCICE 1 1) $\sin x = -0.2 \Rightarrow \begin{cases} x = -11.54^\circ + k360 \ (1) \\ x = 180 + 11.54^\circ + k360 = 191.54^\circ + k360 \ (2) \end{cases}$

(1) $k=0 \quad x<0$ x
$k=1 \quad x = 348.46$ ✓
$k=2 \quad x > 360$ x

(2) $k=0 \quad x = 191.54$ ✓
$k=1 \quad x > 360$ x

2) $\tan(x+80^\circ) = -3 \Rightarrow x+80 = -71.56 + k180 \Rightarrow$
$x = 8.43 + k \cdot 180$
$k=0 \quad x = 8.43^\circ$ ✓
$k=1 \quad x = 188.43$ ✓
$k=2 \quad x > 360$ x

3) $\cos(3x) = \frac{1}{2} \Rightarrow \begin{cases} 3x = 60 + k360 \Rightarrow x = 20 + k120 \ (1) \\ 3x = -60 + k360 \Rightarrow x = -20 + k120 \ (2) \end{cases}$

(1) $k=0 \quad x=20$ ✓
$k=1 \quad x=140$ ✓
$k=2 \quad x=260$ ✓
$k=3 \quad x>360$ x

(2) $k=0 \quad x<0$ x
$k=1 \quad x=100$ ✓
$k=2 \quad x=220$ ✓
$k=3 \quad x=340$ ✓
$k=4 \quad x>360$ x

EXERCICE 2 1) $\sin(20-3x) = 0.2 \Rightarrow$
$\begin{cases} 20-3x = 11.53^\circ + k360 \Rightarrow -3x = -8.48 + k360 \\ 20-3x = 180 - 11.53^\circ + k360 \Rightarrow -3x = 148.47 + k360 \end{cases} \Rightarrow$
$\begin{cases} x = -2.83 + k120 \quad k \in \mathbb{Z} \\ x = -49.49 + k120 \end{cases}$

2) $\sin(3x) - 5\cos(3x) = 0 \Rightarrow \sin(3x) = 5\cos(3x) \Rightarrow$
$\tan(3x) = 5 \Rightarrow 3x = 1.37 + k\pi \Rightarrow$
$\Rightarrow x = 0.46 + \frac{k\pi}{3}$

3) $5\cos^2 x + 6\sin x + 3 = 0 \Rightarrow 5(1-\sin^2 x) + 6\sin x + 3 = 0$
$\Rightarrow -5\sin^2 x + 6\sin x + 8 = 0$
$\sin x = t \quad -5t^2 + 6t + 8 = 0 \quad \Delta = 196$

$$t_{1,2} = \frac{-6 \pm 14}{-10} \begin{cases} -\frac{8}{10} = -\frac{4}{5} \\ \frac{20}{10} = 2 \end{cases}$$

$$\sin x = -\frac{4}{5} \Rightarrow \begin{cases} x = -53,13 + k360 \\ x = 180 + 53,13 + k360 \end{cases} \Rightarrow$$

$$\begin{cases} x = -53,13 + k360 \\ x = 233,13 + k360 \end{cases}$$

EXERCICE 3 1) $\tan\alpha = -7 \quad \alpha \in Q_{II}$

$$\tan\alpha = \frac{\sin\alpha}{\cos\alpha} = -7 \Rightarrow \sin\alpha = -7\cos\alpha$$

$$\sin^2\alpha + \cos^2\alpha = 1 \Rightarrow 49\cos^2\alpha + \cos^2\alpha = 1 \Rightarrow$$

$$\Rightarrow 50\cos^2\alpha = 1 \Rightarrow \cos^2\alpha = \frac{1}{50} \Rightarrow \cos\alpha = \pm\frac{1}{\sqrt{50}}$$

$$\alpha \in Q_{II} \Rightarrow \cos\alpha < 0 \Rightarrow \cos\alpha = -\frac{1}{\sqrt{50}}$$

$$\sin\alpha = -7 \cdot \left(-\frac{1}{\sqrt{50}}\right) = \frac{7}{\sqrt{50}}$$

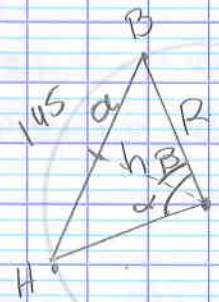
2) $\alpha \in Q_{III} \quad \sin\beta = -\frac{2}{5}$

$$\sin^2\beta + \cos^2\beta = 1 \Rightarrow \cos^2\beta = 1 - \frac{4}{25} = \frac{21}{25} \Rightarrow$$

$$\cos\beta = \pm\frac{\sqrt{21}}{5} \quad \alpha \in Q_{III} \Rightarrow \cos\beta = -\frac{\sqrt{21}}{5}$$

$$\tan\beta = \frac{-2/5}{-\sqrt{21}/5} = \frac{2}{\sqrt{21}} = \frac{2\sqrt{21}}{21}$$

EXERCICE 4



a) $L = 2\pi R \cdot \frac{\alpha}{360} \Rightarrow 145 = 2\pi 6378 \cdot \frac{\alpha}{360}$

$$\Rightarrow \alpha = 1,13^\circ \Rightarrow \beta = 0,65^\circ$$

$$\sin\beta = \frac{a}{R} \Rightarrow \sin 0,65 = \frac{a}{6378} \Rightarrow$$

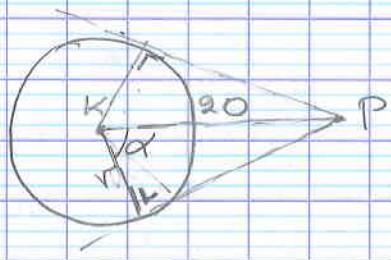
$$a = 72,354$$

$$\Rightarrow HB = 2 \cdot a \Rightarrow HB = 144,709 \text{ Km}$$

b) $\cos\beta = \frac{h}{R} \Rightarrow h = 6377,589$

$$\Rightarrow \text{max} = R - h = 0,41 \text{ Km}$$

EXERCICE 5



$r = 10$.

$\cos\alpha = \frac{10}{20} = \frac{1}{2} \Rightarrow \alpha = 60^\circ$.

$L = 2\pi \cdot r \cdot \frac{120}{360} = 20.94\,m$.

EXERCICE 6

$f(x) = \sin x$