INSA INSTITUT NATIONAL DES SCIENCES APPLIQUÉES LYON

SCAN 1 — Quiz #1 — 10' *September 26, 2018*

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Exercise 1. Fill in the blank:

3

$$\cos\left(\frac{53\pi}{6}\right) = \cos\left(\frac{48\pi}{6} + \frac{5\pi}{6}\right) = \cos\left(\frac{5\pi}{6}\right) = -\frac{\sqrt{3}}{2}$$

Exercise 2. Write the following expression with the $\sum$ symbol.

3

$$-1^3 + 2^3 - 3^3 + \cdots + 18^3 = \sum_{k=1}^{18} (-1)^k k^3$$

Exercise 3. Let $n \in \mathbb{N}$. Simplify:

2

$$\frac{(3n+4)!}{(3n+2)!} = \frac{(3n+2)!\,(3n+3)(3n+4)}{(3n+2)!} = (3n+3)(3n+4)$$

Exercise 4. Let $\theta \in \mathbb{R}$ such that $\cos(2\theta) = 1/3$. Determine the value of $\cos^2\theta$:

2

$$\cos^2\theta = \frac{\cos(2\theta)+1}{2} = \frac{\frac{1}{3}+1}{2} = \frac{4}{6} = \frac{2}{3}$$

Exercise 5. Let $x \in \mathbb{R}$. Fill in the blanks:

4

$$\cos(x) = 0 \iff \exists k \in \mathbb{Z} \,/\, x = \frac{\pi}{2} + k\pi$$
$$\sin(x) = -1 \iff \exists k \in \mathbb{Z} \,/\, x = -\frac{\pi}{2} + 2k\pi$$

Exercise 6. Let $u, v \in \mathbb{R}$. Fill in the blank with the addition or substraction formula:

2

$$\cos(u+v) = \cos(u)\cos(v) - \sin(u)\sin(v)$$
$$\sin(u-v) = \sin(u)\cos(v) - \cos(u)\sin(v)$$

Exercise 7. Let $t \in \mathbb{R}$. Recall the double angle formula:

1

$$\sin(2t) = 2\sin(t)\cos(t)$$

Exercise 8. Fill in the blanks:

3

$$\cos\left(\frac{\pi}{3}\right) = \frac{1}{2} \qquad \sin\left(\frac{\pi}{3}\right) = \frac{\sqrt{3}}{2} \qquad \cos\left(\frac{\pi}{4}\right) = \frac{\sqrt{2}}{2}$$