

## § 10.3 還元公式

### 問題 10.3.1

$$\cos \frac{35\pi}{6} = \cos \left( \frac{35\pi}{6} - 6\pi \right) = \cos \left( -\frac{\pi}{6} \right) = \cos \frac{\pi}{6} = \frac{\sqrt{3}}{2} .$$

次のようにも計算できる：

$$\begin{aligned} \cos \frac{35\pi}{6} &= \cos \left( \frac{35\pi}{6} - 4\pi \right) = \cos \frac{11\pi}{6} = \cos \left( \frac{5\pi}{6} + \pi \right) = -\cos \frac{5\pi}{6} = -\cos \left( \frac{\pi}{3} + \frac{\pi}{2} \right) = -\left( -\sin \frac{\pi}{3} \right) \\ &= \frac{\sqrt{3}}{2} . \end{aligned}$$

### 問題 10.3.2

$$\cos \left( -\frac{22\pi}{3} \right) = \cos \left( -\frac{22\pi}{3} + 8\pi \right) = \cos \frac{2\pi}{3} = \cos \left( \frac{\pi}{6} + \frac{\pi}{2} \right) = -\sin \frac{\pi}{6} = -\frac{1}{2} .$$

次のようにも計算できる：

$$\cos \left( -\frac{22\pi}{3} \right) = \cos \frac{22\pi}{3} = \cos \left( \frac{22\pi}{3} - 6\pi \right) = \cos \frac{4\pi}{3} = \cos \left( \frac{\pi}{3} + \pi \right) = -\cos \frac{\pi}{3} = -\frac{1}{2} .$$

### 問題 10.3.3

$$\tan \frac{17\pi}{6} = \tan \left( \frac{17\pi}{6} - 3\pi \right) = \tan \left( -\frac{\pi}{6} \right) = -\tan \frac{\pi}{6} = -\frac{1}{\sqrt{3}} .$$

### 問題 10.3.4

$$\tan \left( -\frac{19\pi}{6} \right) = \tan \left( -\frac{19\pi}{6} + 3\pi \right) = \tan \left( -\frac{\pi}{6} \right) = -\tan \frac{\pi}{6} = -\frac{1}{\sqrt{3}} .$$

### 問題 10.3.5

$$\sin \left( x + \frac{23\pi}{2} \right) = \sin \left( x + \frac{23\pi}{2} - 12\pi \right) = \sin \left( x - \frac{\pi}{2} \right) = -\cos x .$$

次のようにも計算できる：

$$\begin{aligned} \sin \left( x + \frac{23\pi}{2} \right) &= \sin \left( x + \frac{23\pi}{2} - 10\pi \right) = \sin \left( x + \frac{3\pi}{2} \right) = \sin \left( x + \frac{\pi}{2} + \pi \right) = -\sin \left( x + \frac{\pi}{2} \right) \\ &= -\cos x . \end{aligned}$$

### 問題 10.3.6

$$\cos \left( x - \frac{21\pi}{2} \right) = \cos \left( x - \frac{21\pi}{2} + 10\pi \right) = \cos \left( x - \frac{\pi}{2} \right) = \sin x .$$

次のようにも計算できる：

$$\begin{aligned} \cos \left( x - \frac{21\pi}{2} \right) &= \cos \left( x - \frac{21\pi}{2} + 12\pi \right) = \cos \left( x + \frac{3\pi}{2} \right) = \cos \left( x + \frac{\pi}{2} + \pi \right) = -\cos \left( x + \frac{\pi}{2} \right) \\ &= \sin x . \end{aligned}$$

### 問題 10.3.7

$$\sin \left( \frac{25\pi}{2} - x \right) = \sin \left( \frac{25\pi}{2} - x - 12\pi \right) = \sin \left( \frac{\pi}{2} - x \right) = -\sin \left( x - \frac{\pi}{2} \right) = -(-\cos x) = \cos x .$$

次のようにも計算できる：

$$\begin{aligned} \sin \left( \frac{25\pi}{2} - x \right) &= -\sin \left( x - \frac{25\pi}{2} \right) = -\sin \left( x - \frac{25\pi}{2} + 14\pi \right) \\ &= -\sin \left( x + \frac{3\pi}{2} \right) = -\sin \left( x + \frac{\pi}{2} + \pi \right) = \sin \left( x + \frac{\pi}{2} \right) \\ &= \cos x . \end{aligned}$$