12/5 課題2 52122305 岩崎純弥

(1) ① $x(t) = \sin(\pi t)$

$T_0 = \frac{2\pi}{\pi} = 2$

② $x(t) = \cos(2t + \frac{\pi}{2})$

$T_0 = \frac{2\pi}{2} = \pi$

③ $x(t) = \sin(t)$

$T_0 = \frac{2\pi}{1} = 2\pi$

④ $x(t) = \cos(\pi t)$

$T_0 = \frac{2\pi}{\pi} = 2$

⑤ $x(t) = \sin(2t + \frac{\pi}{2})$

$T_0 = \frac{2\pi}{2} = \pi$

⑥ $x(t) = \sin(2t)$

$T_0 = \frac{2\pi}{2} = \pi$

⑦ $x(t) = \cos(3\pi t)$

$T_0 = \frac{2\pi}{3\pi} = \frac{2}{3}$

(2) ① 三角関数の加法定理

$\sin(\alpha \pm \beta) = \sin\alpha\cos\beta \pm \cos\alpha\sin\beta$

$\cos(\alpha \pm \beta) = \cos\alpha\cos\beta \mp \sin\alpha\sin\beta$

$\tan(\alpha \pm \beta) = \frac{\tan\alpha \pm \tan\beta}{1 \mp \tan\alpha\tan\beta}$

② 倍角の公式

$\sin 2\theta = 2\sin\theta\cos\theta$

$\cos 2\theta = 1 - 2\sin^2\theta$

$= 2\cos^2\theta - 1$

$\tan 2\theta = \frac{2\tan\theta}{1 - \tan^2\theta}$

③ 3倍角の公式

$\sin 3\theta = 3\sin\theta - 4\sin^3\theta$

$\cos 3\theta = 4\cos^3\theta - 3\cos\theta$

④ 半角の公式

$\sin^2\frac{\theta}{2} = \frac{1 - \cos\theta}{2}$、$\cos^2\frac{\theta}{2} = \frac{1 + \cos\theta}{2}$、$\tan^2\frac{\theta}{2} = \frac{1 - \cos\theta}{1 + \cos\theta}$

⑤ 積→和の公式

$\sin\alpha\cos\beta = \frac{1}{2}\{\sin(\alpha+\beta) + \sin(\alpha-\beta)\}$

$\cos\alpha\sin\beta = \frac{1}{2}\{\sin(\alpha+\beta) - \sin(\alpha-\beta)\}$

$\cos\alpha\cos\beta = \frac{1}{2}\{\cos(\alpha+\beta) + \cos(\alpha-\beta)\}$

$\sin\alpha\sin\beta = -\frac{1}{2}\{\cos(\alpha+\beta) - \cos(\alpha-\beta)\}$

⑥ 和⇒積の公式

$\sin(\alpha+\beta) + \sin(\alpha-\beta) = 2\sin\alpha\cos\beta$

$\sin(\alpha+\beta) - \sin(\alpha-\beta) = 2\cos\alpha\sin\beta$

$\cos(\alpha+\beta) + \cos(\alpha-\beta) = 2\cos\alpha\cos\beta$

$\cos(\alpha+\beta) - \cos(\alpha-\beta) = -2\sin\alpha\sin\beta$

⑦ 三角関数の合成

$a\sin\theta + b\cos\theta$

$= \sqrt{a^2+b^2}\left(\frac{a}{\sqrt{a^2+b^2}}\sin\theta + \frac{b}{\sqrt{a^2+b^2}}\cos\theta\right)$

$= \sqrt{a^2+b^2}\left(\sin\theta\cdot\frac{a}{\sqrt{a^2+b^2}} + \cos\theta\cdot\frac{b}{\sqrt{a^2+b^2}}\right)$

$= \sqrt{a^2+b^2}\left(\sin\theta\cos\alpha + \cos\theta\sin\alpha\right)$

$= \sqrt{a^2+b^2}\sin(\theta+\alpha)$