第 5 章 2.「鈍角の三角比」 第 3 回

解答

1. (1) $\dfrac{1}{\sqrt{2}}$ または $\dfrac{\sqrt{2}}{2}$ (2) $-\dfrac{\sqrt{3}}{2}$ (3) -1 (4) $\dfrac{\sqrt{3}}{2}$

(5) $-\dfrac{1}{2}$ (6) $-\dfrac{1}{\sqrt{3}}$ または $-\dfrac{\sqrt{3}}{3}$ (7) 1 (8) -1

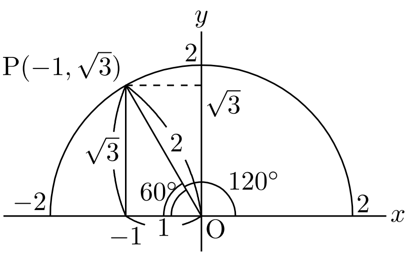
2. (1) $\sin 17^\circ$ (2) $-\cos 9^\circ$ (3) $-\tan 22^\circ$

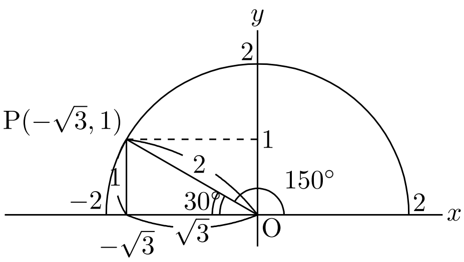
3. (1) $-\dfrac{\sqrt{7}}{4}$ (2) $-\dfrac{3}{\sqrt{7}}$ または $-\dfrac{3\sqrt{7}}{7}$

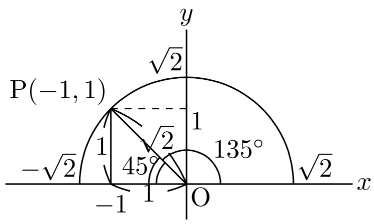
4. (1) $\dfrac{3}{\sqrt{13}}$ または $\dfrac{3\sqrt{13}}{13}$ (2) $\dfrac{2}{\sqrt{13}}$ または $\dfrac{2\sqrt{13}}{13}$

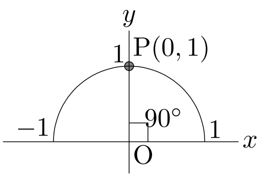
解説

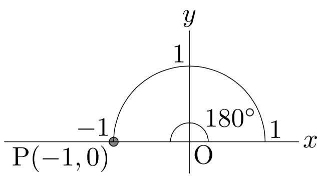
1. 原点を中心として半径 r の半円をかき，半円上の点 $\mathrm{P}(X, Y)$ とする．x 軸の正の向きと線分 OP のなす角を α とすると， $\sin\alpha = \dfrac{Y}{r}$，$\cos\alpha = \dfrac{X}{r}$，$\tan\alpha = \dfrac{Y}{X}$











(1) $\sin 135^\circ = \dfrac{1}{\sqrt{2}} = \dfrac{\sqrt{2}}{2}$ (2) $\cos 150^\circ = \dfrac{-\sqrt{3}}{2} = -\dfrac{\sqrt{3}}{2}$ (3) $\tan 135^\circ = \dfrac{1}{-1} = -1$

(4) $\sin 120^\circ = \dfrac{\sqrt{3}}{2}$ (5) $\cos 120^\circ = \dfrac{-1}{2} = -\dfrac{1}{2}$ (6) $\tan 150^\circ = \dfrac{1}{-\sqrt{3}} = -\dfrac{1}{\sqrt{3}} = -\dfrac{\sqrt{3}}{3}$

(7) $\sin 90^\circ = \dfrac{1}{1} = 1$ (8) $\cos 180^\circ = \dfrac{-1}{1} = -1$

2. (1) $17^\circ + 163^\circ = 180^\circ$ より，
$\sin 163^\circ = \sin 17^\circ$

(2) $9^\circ + 171^\circ = 180^\circ$ より，
$\cos 171^\circ = -\cos 9^\circ$

(3) $22^\circ + 158^\circ = 180^\circ$ より，
$\tan 158^\circ = -\tan 22^\circ$

3. (1) $\cos^2\alpha + \sin^2\alpha = 1$ より，$\cos^2\alpha = 1 - \sin^2\alpha = 1 - \dfrac{9}{16} = \dfrac{7}{16}$ このとき，α は鈍角なので，$\cos\alpha < 0$

よって $\cos\alpha = -\dfrac{\sqrt{7}}{4}$

(2) $\tan\alpha = \dfrac{\sin\alpha}{\cos\alpha} = \dfrac{3}{4} \div \left(-\dfrac{\sqrt{7}}{4}\right) = -\dfrac{3}{4} \times \dfrac{4}{\sqrt{7}} = -\dfrac{3}{\sqrt{7}} = -\dfrac{3\sqrt{7}}{7}$

4. (1) $1 + \tan^2\alpha = \dfrac{1}{\cos^2\alpha}$ より，$\dfrac{1}{\cos^2\alpha} = 1 + \tan^2\alpha = 1 + \dfrac{4}{9} = \dfrac{13}{9}$ よって $\cos^2\alpha = \dfrac{9}{13}$

α は鋭角なので，$\cos\alpha > 0$ よって $\cos\alpha = \dfrac{3}{\sqrt{13}} = \dfrac{3\sqrt{13}}{13}$

(2) $\tan\alpha = \dfrac{\sin\alpha}{\cos\alpha}$ より，$\sin\alpha = \tan\alpha\cos\alpha = \dfrac{2}{3} \cdot \dfrac{3}{\sqrt{13}} = \dfrac{2}{\sqrt{13}} = \dfrac{2\sqrt{13}}{13}$