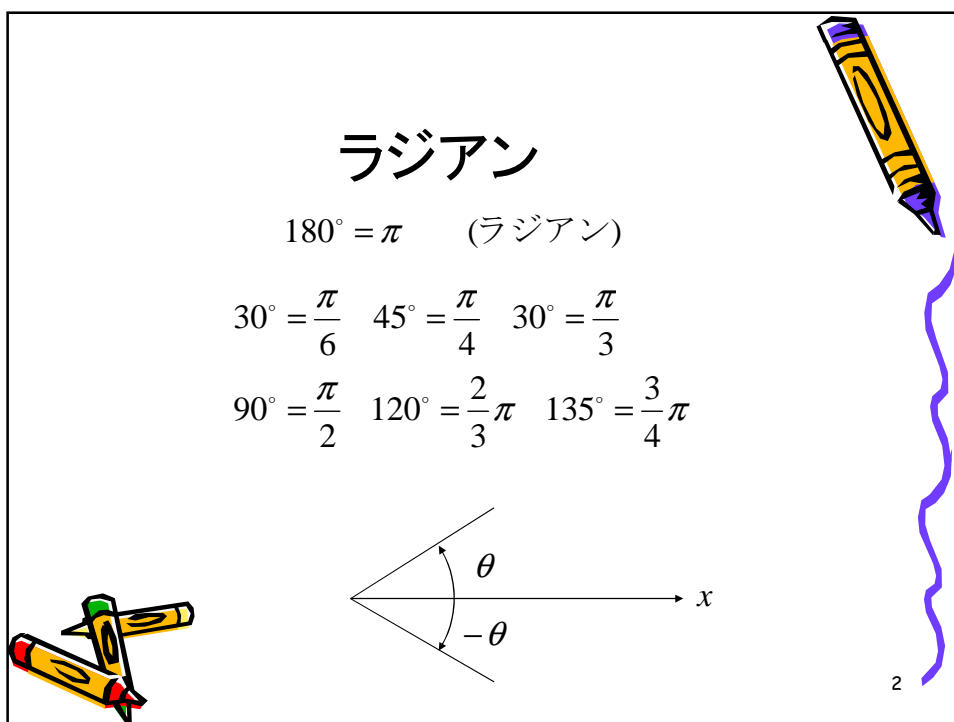


基礎数学Ⅱ

3回目 三角関数

後期
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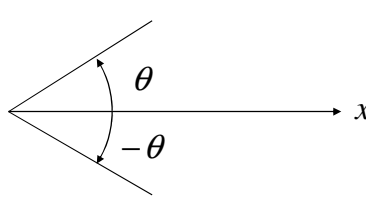


ラジアン

$180^\circ = \pi$ (ラジアン)

$30^\circ = \frac{\pi}{6}$ $45^\circ = \frac{\pi}{4}$ $60^\circ = \frac{\pi}{3}$

$90^\circ = \frac{\pi}{2}$ $120^\circ = \frac{2}{3}\pi$ $135^\circ = \frac{3}{4}\pi$



2

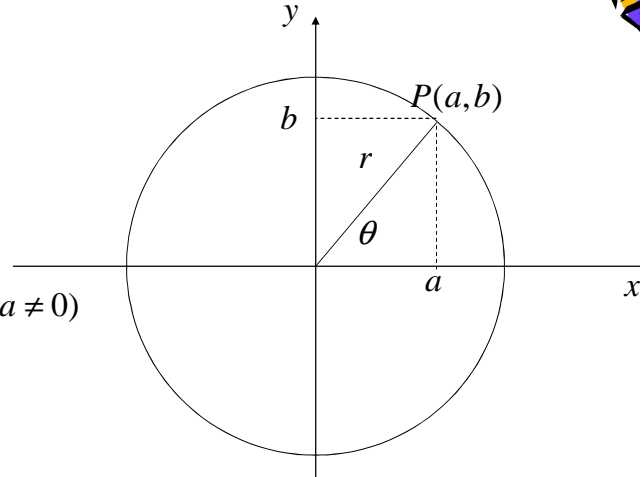
三角関数

$$\cos \theta = \frac{a}{r}$$

$$\sin \theta = \frac{b}{r}$$

$$\tan \theta = \frac{b}{a}$$

($a \neq 0$)



3

三角関数の公式

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

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

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

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

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

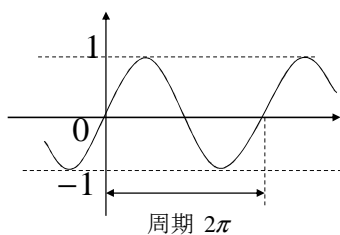
$$\sin^2 \theta = \frac{1 - \cos 2\theta}{2}$$

$$\cos^2 \theta = \frac{1 + \cos 2\theta}{2}$$

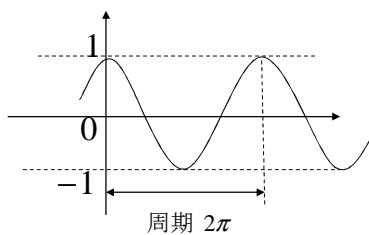
4

三角関数のグラフ

$$y = \sin x$$



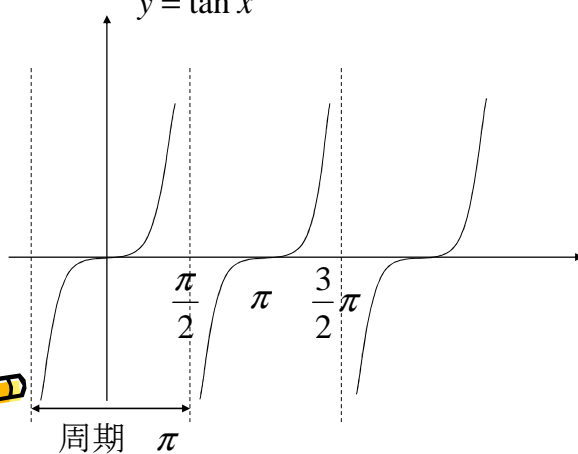
$$y = \cos x$$



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三角関数のグラフ

$$y = \tan x$$



6

$0 \leq \theta \leq \frac{\pi}{2}$ に対して $\sin \theta = \frac{2}{3}$ のとき、次の値を求めよ

$$\cos \theta =$$

$$\tan \theta =$$

$$\cos 2\theta =$$

$$\sin 2\theta =$$

$$\cos^2 \frac{\theta}{2} =$$

$$\cos \frac{\theta}{2} =$$

$$\sin^2 \frac{\theta}{2} =$$

$$\sin \frac{\theta}{2} =$$

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$0 \leq \theta \leq \frac{\pi}{2}$ に対して $\sin \theta = \frac{2}{3}$ のとき、次の値を求めよ

$$\cos \theta = \sqrt{1 - \left(\frac{2}{3}\right)^2} = \sqrt{\frac{5}{9}} = \frac{\sqrt{5}}{3}$$

$$\tan \theta = \frac{2}{\sqrt{5}} = \frac{2\sqrt{5}}{5}$$

$$\cos 2\theta = \cos^2 \theta - \sin^2 \theta = \frac{5}{9} - \frac{4}{9} = \frac{1}{9}$$

$$\sin 2\theta = 2 \sin \theta \cos \theta = 2 \times \frac{2}{3} \times \frac{\sqrt{5}}{3} = \frac{4\sqrt{5}}{9}$$

$$\cos^2 \frac{\theta}{2} = \frac{1 + \cos \theta}{2} = \frac{3 + \sqrt{5}}{6} = \left(\frac{1 + \sqrt{5}}{2\sqrt{3}}\right)^2, \cos \frac{\theta}{2} = \frac{1 + \sqrt{5}}{2\sqrt{3}}$$

$$\sin^2 \frac{\theta}{2} = \frac{1 - \cos \theta}{2} = \frac{3 - \sqrt{5}}{6} = \left(\frac{\sqrt{5} - 1}{2\sqrt{3}}\right)^2, \sin \frac{\theta}{2} = \frac{\sqrt{5} - 1}{2\sqrt{3}}$$

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