

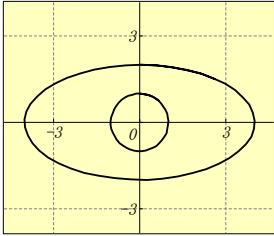
＜関数グラフ2D＞

★円・だ円

パラメータ型

$$x_1(t)=\sin t \quad x_2(t)=4\sin t$$

$$y_1(t)=\cos t \quad y_2(t)=2\cos t$$

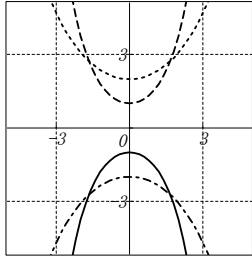


カテナリー(懸垂線)

ノーマル型

$$f_1(x)=\frac{1}{2}(e^x+e^{-x}) \quad f_2(x)=-\frac{1}{2}(e^{-x}+e^x)$$

$$f_3(x)=\frac{2}{2}(e^{\frac{x}{2}}+e^{-\frac{x}{2}}) \quad f_4(x)=-\frac{2}{2}(e^{-\frac{x}{2}}+e^{\frac{x}{2}})$$

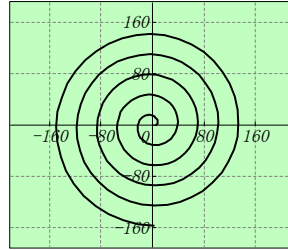


伸開線(インボリュート)

パラメータ型

$$x(\theta)=5(\cos\theta+\theta\sin\theta)$$

$$y(\theta)=5(\sin\theta-\theta\cos\theta)$$



サイクロイド

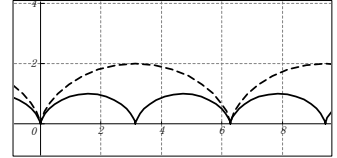
パラメータ型

$$x_1(\theta)=\frac{1}{2}(\theta-\sin\theta)$$

$$y_1(\theta)=\frac{1}{2}(1-\cos\theta)$$

$$x_2(\theta)=\theta-\sin\theta$$

$$y_2(\theta)=1-\cos\theta$$



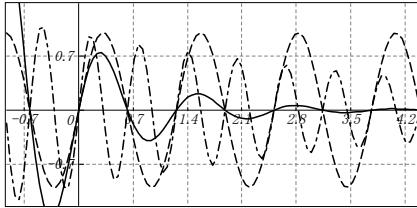
減衰振動曲線

ノーマル型

$$y=e^{-x}\sin 5x$$

$$y=e^{-0.001x}\sin 5x$$

$$y=e^{-0.2x}\sin 10x$$



★グラフの回転

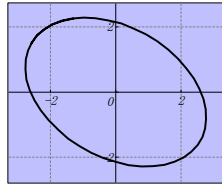
変換式 $a(t)=x\cos t - y\sin t$
 $b(t)=x\sin t + y\cos t$

$$t = \frac{\pi}{3}$$

楕円 $x(\theta)=2\sin\theta$
 $y(\theta)=3\cos\theta$

$$a(t)=2\sin t \cos \frac{\pi}{3} - 3\cos t \sin \frac{\pi}{3}$$

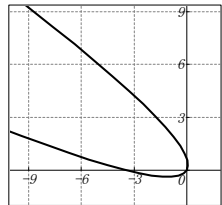
$$b(t)=2\sin t \sin \frac{\pi}{3} + 3\cos t \cos \frac{\pi}{3}$$



放物線 $y=x^2$

$$a(t)=t\cos \frac{\pi}{3} - t^2\sin \frac{\pi}{3}$$

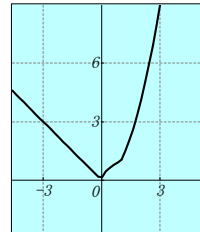
$$b(t)=t\sin \frac{\pi}{3} + t^2\cos \frac{\pi}{3}$$



★条件式のグラフ

ノーマル型

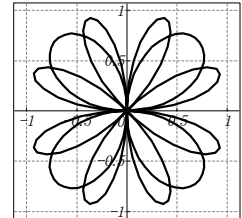
$$f(x)=\begin{cases} |x| & (x < 0) \\ \sqrt{x} & (0 \leq x < 1) \\ x^2 & (1 \leq x) \end{cases}$$



パラメータ型

$$x(\theta)=\begin{cases} \sin 2\theta \cos \theta & (0 < \theta < 2\pi) \\ \sin 4\theta \cos \theta & (2\pi \leq \theta < 4\pi) \end{cases}$$

$$y(\theta)=\begin{cases} \sin 2\theta \sin \theta & (0 < \theta < 2\pi) \\ \sin 4\theta \sin \theta & (2\pi \leq \theta < 4\pi) \end{cases}$$



★極座標形式のグラフ

媒介変数型グラフへ変更する

$$x(\theta)=5(\cos\theta+\theta\sin\theta)$$

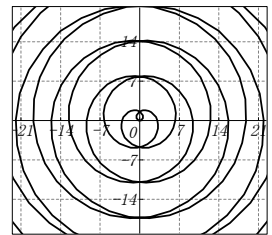
$$y(\theta)=5(\sin\theta-\theta\cos\theta)$$

代数らせん(アルキメデスのらせん)

$$x(\theta)=\theta\cos\theta$$

$$y(\theta)=\theta\sin\theta$$

$$r=f(\theta) \rightarrow \begin{cases} x(\theta)=f(\theta)\cos\theta \\ y(\theta)=f(\theta)\sin\theta \end{cases}$$

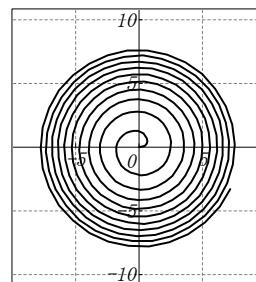


$$r=a\theta \rightarrow \begin{cases} x(\theta)=a\theta\cos\theta \\ y(\theta)=a\theta\sin\theta \end{cases}$$

放物らせん

$$x(\theta)=\sqrt{\theta}\cos\theta$$

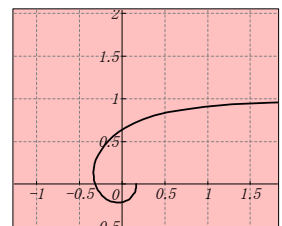
$$y(\theta)=\sqrt{\theta}\sin\theta$$



逆らせん

$$x(\theta)=\frac{\cos\theta}{\theta}$$

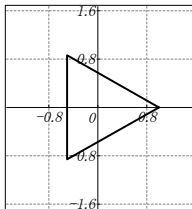
$$y(\theta)=\frac{\sin\theta}{\theta}$$



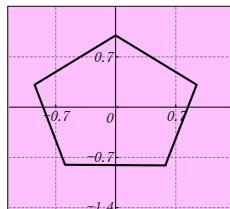
◎グラフの応用

多角形を描く(円の応用)

三角形 $x(\theta)=\cos\theta$
 $y(\theta)=\sin\theta$
 $(0 \leq \theta \leq 2\pi)$
 分割数 3



五角形 $x(\theta)=\cos(\theta-54^\circ)$
 $y(\theta)=\sin(\theta-54^\circ)$
 $(0 \leq \theta \leq 2\pi)$
 分割数 5



直線を描く

$$f(x)=\begin{cases} 1 & 0 \leq x < 4 \end{cases}$$

$$x(t)=1$$

$$y(t)=\begin{cases} t & 0 \leq t < 4 \end{cases}$$

$$g(x)=\begin{cases} x & 0 \leq x < 4 \end{cases}$$

