$$\left(\begin{array}{l} L=-\dfrac{d^2}{dx^2}+1 \\ Lf=\lambda f \\ -\dfrac{d^2 f}{dx^2}+f=\lambda f \\ -k^2+1-\lambda=0 \end{array}\right) \Rightarrow \left[\begin{array}{l} \begin{cases} \lambda<1; \\ f=A*e^{x\sqrt{1-\lambda}}+B*e^{-x\sqrt{1-\lambda}} \end{cases} \\ \begin{cases} \lambda>1; \\ f=A*\sin\left(\sqrt{\lambda-1}*x\right)+B*\cos\left(\sqrt{\lambda-1}*x\right) \end{cases} \\ \begin{cases} \lambda=1; \\ f=A*x+B \end{cases} \end{array}\right.$$

$I;\lambda<1$

$$f=A*e^{x\sqrt{1-\lambda}}+B*e^{-x\sqrt{1-\lambda}}$$

$$f`=A*\sqrt{1-\lambda}*e^{x\sqrt{1-\lambda}}-B*\sqrt{1-\lambda}*e^{-x\sqrt{1-\lambda}}$$

$$f(-\pi)=A*e^{-\pi\sqrt{1-\lambda}}+B*e^{\pi\sqrt{1-\lambda}}$$

$$f(\pi)=A*e^{\pi\sqrt{1-\lambda}}+B*e^{-\pi\sqrt{1-\lambda}}$$

$$f`(\pi)=A*\sqrt{1-\lambda}*e^{\pi\sqrt{1-\lambda}}-B*\sqrt{1-\lambda}*e^{-\pi\sqrt{1-\lambda}}$$

$$\begin{cases} f(-\pi)=0 \\ f`(\pi)+kf(\pi)=0 \end{cases} \Rightarrow \begin{cases} A*e^{-\pi\sqrt{1-\lambda}}+B*e^{\pi\sqrt{1-\lambda}}=0 \\ A*\sqrt{1-\lambda}*e^{\pi\sqrt{1-\lambda}}-B*\sqrt{1-\lambda}*e^{-\pi\sqrt{1-\lambda}}+kA*e^{\pi\sqrt{1-\lambda}}+kB*e^{-\pi\sqrt{1-\lambda}}=0 \end{cases} \Rightarrow$$

$$\begin{cases} A=-B*e^{2\pi\sqrt{1-\lambda}} \\ A*\left(k+\sqrt{1-\lambda}\right)*e^{\pi\sqrt{1-\lambda}}+B*\left(k-\sqrt{1-\lambda}\right)*e^{-\pi\sqrt{1-\lambda}}=0 \end{cases} \Rightarrow \begin{cases} A=-B*e^{2\pi\sqrt{1-\lambda}} \\ e^{2\pi\sqrt{1-\lambda}}*\left(k+\sqrt{1-\lambda}\right)=\left(k-\sqrt{1-\lambda}\right)*e^{-2\pi\sqrt{1-\lambda}} \end{cases} \Rightarrow \begin{cases} k>0 \\ \sqrt{1-\lambda}=0 \Rightarrow \{\varnothing\} \\ \lambda<1!!! \end{cases}$$

$II;\lambda>1$

$$f=A*\sin\left(x\sqrt{\lambda-1}\right)+B*\cos\left(x\sqrt{\lambda-1}\right)$$

$$f`=A*\sqrt{\lambda-1}*\cos\left(x\sqrt{\lambda-1}\right)-B*\sqrt{\lambda-1}*\sin\left(x\sqrt{\lambda-1}\right)$$

$$f(-\pi)=A*\sin\left(-\pi\sqrt{\lambda-1}\right)+B*\cos\left(-\pi\sqrt{\lambda-1}\right)=-A*\sin\left(\pi\sqrt{\lambda-1}\right)+B*\cos\left(\pi\sqrt{\lambda-1}\right)$$

$$f(\pi)=A*\sin\left(\pi\sqrt{\lambda-1}\right)+B*\cos\left(\pi\sqrt{\lambda-1}\right)$$

$$f`(\pi)=A*\sqrt{\lambda-1}*\cos\left(\pi\sqrt{\lambda-1}\right)-B*\sqrt{\lambda-1}*\sin\left(\pi\sqrt{\lambda-1}\right)$$

$$\begin{cases} f(-\pi)=0 \\ f`(\pi)+kf(\pi)=0 \end{cases} \Rightarrow \begin{cases} -A*\sin\left(\pi\sqrt{\lambda-1}\right)+B*\cos\left(\pi\sqrt{\lambda-1}\right)=0 \\ A*\sqrt{\lambda-1}*\cos\left(\pi\sqrt{\lambda-1}\right)-B*\sqrt{\lambda-1}*\sin\left(\pi\sqrt{\lambda-1}\right)+kA*\sin\left(\pi\sqrt{\lambda-1}\right)+kB*\cos\left(\pi\sqrt{\lambda-1}\right)=0 \end{cases} \Rightarrow$$

$$\begin{cases} \pi\sqrt{\lambda-1}=\alpha \\ A=B*\dfrac{\cos(\alpha)}{\sin(\alpha)} \\ \sqrt{\lambda-1}*\cos^2(\alpha)-\sqrt{\lambda-1}*\sin^2(\alpha)+2k\cos(\alpha)\sin(\alpha)=0 \end{cases} \Rightarrow \begin{cases} \pi\sqrt{\lambda-1}=\alpha \\ A=\dfrac{B}{tg(\alpha)} \\ \sqrt{\lambda-1}*\cos(2\alpha)+k\sin(2\alpha)=0 \end{cases} \Rightarrow \begin{cases} \pi\sqrt{\lambda-1}=\alpha \\ A=\dfrac{B}{tg(\alpha)} \\ tg\left(2\pi\sqrt{\lambda-1}\right)=-\dfrac{\sqrt{\lambda-1}}{k} \end{cases}$$

$$\begin{cases} A^2+B^2=1 \\ A=B*\dfrac{\cos(\alpha)}{\sin(\alpha)} \end{cases} \Rightarrow \begin{cases} A=\cos(\alpha) \\ B=\sin(\alpha) \end{cases}$$

$$f=A*\sin\left(x\sqrt{\lambda-1}\right)+B*\cos\left(x\sqrt{\lambda-1}\right)=\cos(\alpha)*\sin\left(x\sqrt{\lambda-1}\right)+\sin(\alpha)*\cos\left(x\sqrt{\lambda-1}\right)=\sin\left(x\sqrt{\lambda-1}+\alpha\right)=\sin\left(x\sqrt{\lambda-1}+\pi\sqrt{\lambda-1}\right)$$

$$\left[\begin{array}{l} f=\sin\left((x+\pi)\sqrt{\lambda-1}\right) \\ tg\left(2\pi\sqrt{\lambda-1}\right)=-\dfrac{\sqrt{\lambda-1}}{k} \end{array}\right]$$