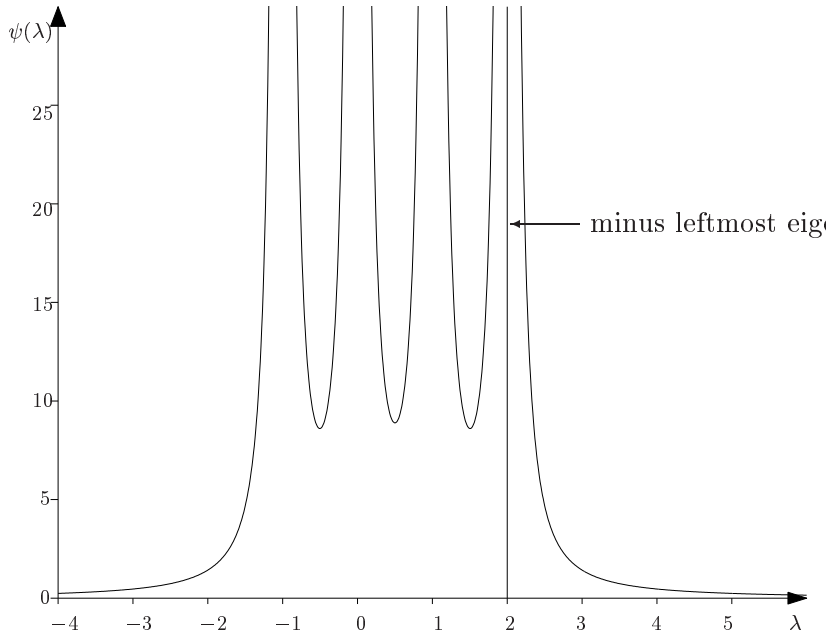

$$B = \begin{pmatrix} -2 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{pmatrix}$$

$$g = \begin{pmatrix} 1 \\ 1 \\ 1 \\ 1 \end{pmatrix}$$