

Energy Levels

Consider the differential equation

$$\psi''(x) + V(x)\psi(x) = \lambda\psi(x),$$

where $V : \mathbb{R} \rightarrow \mathbb{R}$ is some function and $\lambda \in \mathbb{R}$ is some real constant.

Assume that V is periodic, i.e., there is an $L > 0$ so that $V(x+L) = V(x)$ for all x , and smooth. For which values of λ does there exist a **bounded** solution to the differential equation?