

## Lab-02

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1. Write a generic root finding program in MATLAB that uses the Newton-Raphson method. The inputs to the functions should be the initial guess, the relative tolerance and the handles to functions containing the function whose root is being found and its derivative.
2. Use the above program to determine the roots of the function (first 5) roots

$$\cos(k) - \cos(\alpha) - 50 \frac{\sin(\alpha)}{\alpha} = 0$$

for  $k = 0, \frac{\pi}{2}$ .

3. (**Homework**) Now write a program which will find the roots for various  $K$ s and plot the Energy Vs.  $K$  diagram to get the band diagram for the Kronig-Penny model. Note that  $\alpha$  is related to energy via the relation:  $\alpha = \frac{\sqrt{2mE}}{\hbar}$
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