Homework 4 solutions

Question 3

(a) Time-independent Schroedinger equation

$$E\psi = \Big(-\frac{\hbar^2}{2m}\nabla^2 + V \Big)\psi \tag{1}$$

with potential given by

$$V(x) = -\eta\delta(x),\ \eta > 0 \tag{2}$$

therefore

$$\int E\psi(x)dx = \int -\frac{\hbar^2}{2m}\frac{d^2}{dx^2}\psi dx + \int -\eta\delta(x)dx \tag{3}$$

$$\int E\psi(x)dx = -\frac{\hbar^2}{2m}\int \frac{d^2}{dx^2}\psi dx - \eta\int \delta(x)dx \tag{4}$$

$$\tag{5}$$