Questions:

1. Consider the time-independent Schrödinger equation in a region of $x$ for which $V(x) = V_0 = \text{constant}$. Let us define

$$k = \sqrt{\frac{2m(E - V_0)}{\hbar^2}} \quad \text{when } E > V_0 \quad (\text{classically allowed}),$$

and

$$\kappa = \sqrt{\frac{2m(V_0 - E)}{\hbar^2}} \quad \text{when } E < V_0 \quad (\text{classically forbidden}).$$

(a) What is the time-independent Schrödinger equation in this interval, for $E > V_0$, $E = V_0$, and $E < V_0$. Express your answer in terms of $k$ or $\kappa$ for $E \neq V_0$.

(b) What is the general solution in each case?