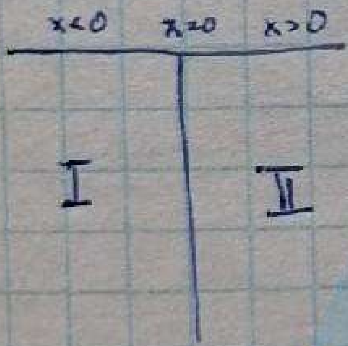
Задача 8



$$\psi_{I} = e^{ikx} + \underbrace{r\, e^{-ikx}}_{\text{отраж.}}$$

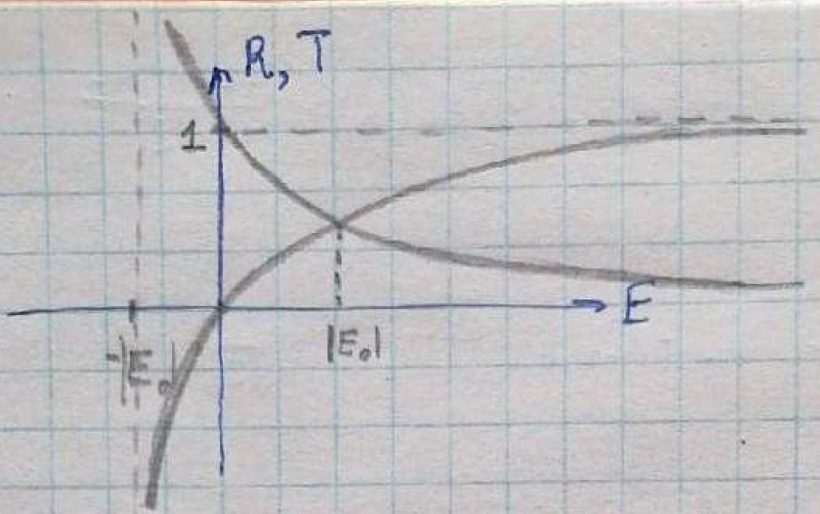
$$\psi_{II} = t\, e^{ikx} \text{ - прошедш.}$$

$$\begin{cases} \psi(+0) = \psi(-0) \\ \psi'(+0) - \psi'(-0) = -\frac{2m\alpha}{\hbar^2}\psi(0) \end{cases} \longrightarrow \begin{cases} 1 + r = t \\ ik\left(t - (1-r)\right) = -\frac{2m\alpha}{\hbar^2} t \end{cases}$$

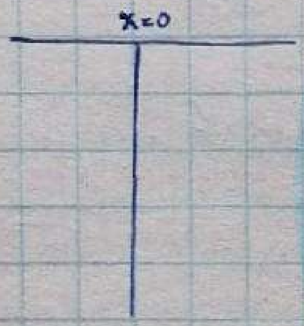
$$r = -\frac{\frac{m\alpha}{\hbar^2 ik}}{1 + \frac{m\alpha}{\hbar^2 ik}}$$

$$R = |r|^2 = \frac{|E_0|}{E + |E_0|}$$

$$T = |t|^2 = \frac{E}{|E_0| + E}$$



Задача 9



$$U(x) = -\alpha_0 \delta(x) \longrightarrow U(x) = -\alpha_1 \delta(x)$$

$P_{вых}$ - ?

Вид волнов. ф-ции в I случае:

$$\alpha_0 \delta(x): \quad \psi_0(x) = \sqrt{\varkappa_0}\, e^{-\varkappa_0 |x|}, \quad \varkappa_0 = \underbrace{\frac{2m|E|}{\hbar^2}}_{\text{параметр ямы}}$$

Во II случае:

$$\alpha_1 \delta(x): \quad \psi_1(x) = \sqrt{\varkappa_1}\, e^{-\varkappa_1 |x|}$$

$$P = \left| \int \psi_0^*(x) \psi_1(x)\, dx \right|^2 = \varkappa_0 \varkappa_1 \left| \int e^{-(\varkappa_0 + \varkappa_1)|x|} dx \right|^2 =$$

$$= \varkappa_0 \varkappa_1 \left(\frac{2}{\varkappa_0 + \varkappa_1} \right)^2$$

$$P_{вых} = 1 - P = 1 - \frac{4 \varkappa_0 \varkappa_1}{(\varkappa_0 + \varkappa_1)^2} = \left(\frac{\varkappa_0 - \varkappa_1}{\varkappa_0 + \varkappa_1} \right)^2$$