PHY-851 QUANTUM MECHANICS I
Homework 5, 25 points
October 3 - 10, 2001
<u>**One-dimensional motion**</u>.

Reading: *Merzbacher*, Chapter 6.

1. /6/ *Merzbacher*, Problem 2, p. 111.

2. /4/ The same, as in the previous problem, but for the scattering from the barrier, $V = V_0 > 0$ for $0 \le x \le a$.

3. /6/ *Merzbacher*. Problem 5, p. 112.

4. Consider a potential barrier $U(x)$ which goes to zero for $x \to -\infty$, to the constant $U_0 > 0$ for $x \to \infty$ and has an arbitrary shape in between. A particle moves with energy $E > U_0$.

   a. /3/ Show that the relation between the reflection and transmission coefficients,

   $$R(E) + T(E) = 1, \tag{1}$$

   is always valid.

   b. /6/ Show that $R(E)$ and $T(E)$ do not depend on the direction of incidence of the wave (from the left or from the right).