

StudentID: \_\_\_\_\_

**PHYS 451 Quantum Mechanics II (Fall 2017)**  
**Quiz #4**

Estimate the probability of an electron emission from metal in the presense of an external uniform electric field  $\mathcal{E}$ . Assume that the electron has the energy  $E = -V_0$  while in the metal.

**Appendix: WKB wave function**

$$\psi(x) = \frac{A}{\sqrt{p(x)}} \exp \left[ +\frac{i}{\hbar} \int p(x) dx \right] + \frac{B}{\sqrt{p(x)}} \exp \left[ -\frac{i}{\hbar} \int p(x) dx \right], \text{ where } p(x) = \sqrt{2m(E - V(x))}$$