2. **Delta function potential**

Consider a particle of mass m moving nonrelativistically in one dimension subject to an attractive delta-function potential $V(x) = -V_0\delta(x)$, with $V_0 > 0$.

(a) What are the energy and the normalized wavefunction of this particle's ground state?

(b) The particle is perturbed by a weak additional time-dependent potential

$$V_1(x,t) = Fx\cos(\omega t) \ .$$

What is the transition rate from the ground state to the continuum? [It might be helpful to confine the particle in a large "box" $|x| < L$ and then take the limit $L \to \infty$.]