Physics 214 **Quiz 4-2 [20 points]**

An electron is confined to a 1-dimensional infinite potential well of width *L*. The energy of the electron in the first excited state (*n* = 2) is 12 eV.

1. [5 points] What is the energy of the electron in its ground state (e.g., its lowest energy state)?

$E_{n=1} = E_{n=2} /4 = 3$ eV

2. [5 points] What is the width *L* of the well?

$L = 1/(\text{sqrt}(8\ m\ E_1)/h) = .354$ nm

3. [6 points] What is the minimum energy photon that could be absorbed so that the electron can transition from the first to the fourth (*n* = 5) excited state?

$E = (E_5-E_2) = (5\text{^}2-2\text{^}2)\ 3$ eV = 63 eV

4. [4 points] If we double the width of the well what happens to the energy of the first excited state?

It goes down by a factor of 4.