ECO 161: FOUNDATIONS OF ECONOMICS

- **Due date:**
- You should complete this in partnership with another student (and turn in one set of solution with both names on it).

INCANDESCENT vs. ENERGY EFFICIENT LIGHT BULBS

- I bought an energy efficient light bulb last year. I am wandering if it was worth it (monetarily).

- Energy efficient light bulbs (Compact Fluorescent Light bulbs or CFLs) cost more than incandescent light bulbs, but they last longer and use less electricity to produce the same light-output.

- 100 watt[1] incandescent light bulb costs $0.35 and lasts 1,000 hours.
  23 watt CFL produces the same light-output as a 100 watt incandescent bulb, costs $6.00 and lasts 8,000 hours.

- In term of electricity cost, I pay about $0.12 for 1 kilowatt (1 kilowatt = 1000 watts) and let's assume I use a bulb for 2000 hours in a year.
  - To compute the electricity cost, suppose a 100 watt light bulb is being used for 20 hours. The electricity consumption is 2,000 watts, or 2 kilowatt, for these 20 hours (20 hours * 100 watts per hour). The electricity cost is: 2 kilowatts * $0.12 = $0.24 (24 cents).

1. Compute the total cost of each type of bulb over the four year period (the life-span of the energy efficient light bulb given annual usage of 2,000 hours). Since costs are spread over the next four years we need to use present value computations. Assume the discount (interest rate) is 4%. Given all these assumptions, was it worth it to buy the energy-efficient light bulb? Show all of your work , fully explain and clearly state any assumptions you make.
2. Based on your computations in (1), what is the maximum price you are willing to pay for the energy efficient light bulb? Explain.
3. If cost of electricity increases, would that make the energy efficient light bulb more or less attractive (in terms of cost)? Explain intuitively (you should not compute anything).
4. If the light bulb is used less than 2000 hours in a year, would that make the energy efficient light bulb more or less attractive (in terms of cost)? Explain intuitively (you should not compute anything).

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[1] 100 watt bulb uses 100 watts per hour.