ISP209 Spring 2002 **Homework 4** Name: _____
Due: Thurs., Feb. 7, 2:40 pm, in Rm 118PA. ID:_____

Homework Problems:

1. Which force(s), electromagnetic(E), gravitational(G), weak nuclear(WN) or strong nuclear(SN), is(are) primarily responsible for the following (100% correct for credit):

color of a flower. ____
exposure of photo film by X-rays _____
evaporation of sweat. _____
decay of Carbon-14 to Nitrogen-14_____
reading a CD by a computer. _____
rotting of a banana. _____
thinking about life. _____
calling using a cellular phone. _____
bouncing of light off a mirror. _____
rotation of our galaxy. _____
sensing motion using infrared. _____
floating of a nuclear submarine ___ & ____

2. Four force vectors act on an object: $\mathbf{F}_1 = +A$, $\mathbf{F}_2 = +3A$, $\mathbf{F}_3 = -2A$, and $\mathbf{F}_4$. If the forces balance, $\mathbf{F}_{\text{Net}} = 0$, including all four forces, what is $\mathbf{F}_4$? _____

(show work here)

3. A rope, considered massless, has a length, L = 10 m , and a tension, T = 50 N. What is the tension at the middle of the rope? _____
4. How should I connect 5 weak springs, spring constant, k, to make a spring five times stronger and what will be the new spring constant. _____

(Draw the connected springs here)

5. I have one spring but need one twice as strong. How can I get it from what I have?
6. I have four identical springs and would like to make a longer spring with the same spring constant. How should I connect them to accomplish this?

(Draw the connected springs here)

7. Complete this sentence: springs generate _____ and store _____.
8. From the formulas that predict the spring constants of parallel and series connected springs, describe why a material cut into shorter pieces, each piece has a larger spring constant, or cut into narrow strips, each piece has a smaller spring constant.

9. A spring, spring constant, k, is cut into two shorter pieces. One piece is 1/4 of the original length. What are the spring constants of both pieces?