

NOTE: INDIVIDUALS: Use engineering format for problems 1-4. Each student should turn in problems 1 through 4 in their own homework. If you did problem 4 with a partner, you should each individually turn in the SolidWorks sketch with your homework.

TEAMS: Complete problems 5 through 6 as a team, and turn in one paper for each team. Use non-engineering format for these problems. Write the names of all team members on the paper that you turn in for the team. This homework will be part of your design journal due class 19. Make an electronic copy of this homework for your records before you submit it.

1. You want to buy a new jeep that cost \$24,000. You intend to pay \$2400 down payment and finance \$21,600. You are given two options. Option 1: finance through the local bank at 2.99% per year for 48 months, compounded monthly. Option 2: finance through a credit union at 3.99% per year for 48 months and is a simple interest loan. Which loan has the greater future value (greater cost to you)?
Option 1: $F = \$24,340.57$, Option 2: $F = \$25,047.36$
2. If you want to have \$6000 when you graduate from college to take a European vacation, how much would you need to invest now assuming you could earn a 4.5% annual interest rate compounded monthly over a 4-year period? Perform this calculation using the formula given in class. After performing the calculation, create an Excel spreadsheet listing the net worth of your account every month over the four-year period (starting with the P you computed above and ending with \$6000). $\$5013.31$
3. You win a sweepstakes that will award a lump sum prize of \$150,000. You decide to invest all of the prize money into a savings account that earns 0.06% annual interest compounded quarterly (4 times each year) for 20 years. How much will your prize money be worth at the end of the 20-year savings period? $\$151,810.71$
4. Make an enclosure such as a box out of foam board – it's OK to be creative with the shape. The box should have six sides so it is completely enclosed. This will build some of the skills that you may need when creating your prototype later in the quarter. Use the presentation entitled "foam core" on the Class 6 schedule for directions. Please make sure you have something under your foam board so you don't damage desktops and other surfaces around campus (or cut outside on a concrete surface).

You can complete the foam board project in teams of two or individually. Please bring your foam board creation to class 12 to show your instructor, and include a SolidWorks drawing of what you create with your homework. We will likely run out of foam board in Ruston, so if you go home over the weekend, you might want to pick up a piece. A business that makes signs would probably sell you a piece, or you could get it at DollarTree, Walmart, Office Depot, the University Bookstore, Hobby Lobby, etc.

This is the start of the team homework. Please submit one paper per group. Use non-engineering format for your solutions.

5. In class 11, you presented your design idea to the class. You should have also started to determine the sensors and other parts needed to implement your project. If you haven't done so already, meet with your instructor so you can agree on the sensors or other parts that you will "check out" from the University. Drop by the Project-Based Learning Office in Bogard Hall 222 to obtain these parts; please note the parts-distribution hours on the door of the Project-Based Learning Office.

Create an Excel spreadsheet listing the sensors and parts that you will obtain from the University. Include a brief part description, the part numbers, the vendor, and the part cost in your spreadsheet. Also include a column designating whether or not you have received the item yet.

6. Determine the other parts that you need to move forward. Do you need more foam core, sheet metal, paint, tape, wood, screws or other items? Create an Excel spreadsheet listing the items that you need to purchase yourself. In your spreadsheet, provide a brief description of the item, the part number, the vendor, and the cost (you may not know all of this information). Also include the date that you expect to acquire the item (remember shipping). You will likely discover that you need additional items as the design unfolds.
7. **(Due Class 13)** Begin working on your second prototype. As you design / build the prototype, think about how your sensors, the Arduino, your actuators, and other parts will be included in the design. It's OK to go ahead and start placing any sensors that you have already on the prototype. Remember that this prototype should be a step forward from what you brought to class for your first prototype. It is still early in the design process, so retain some flexibility to make changes to your concept if needed.

Bring any tools you need to class next time to work on your second prototype. You should have about one hour in class to work on the prototype. Be sure to bring your safety glasses.