

NOTE: INDIVIDUALS: Use engineering format for problems 1-4. Each student should turn in problems 1 through 4 in their own homework.

TEAMS: Complete problem 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.

- After one full year of work as an engineer, you decide to treat yourself to a new vehicle, a Mercedes GLC 350e for \$49,990 plus 8.5% sales tax. If you intend to pay the car off in 60 months, how much will your total out of pocket be for the vehicle (not counting insurance, maintenance differences between your cars, etc.)? Assume you will be paying 4.2% annual interest compounded monthly. Include the cash flow diagram as part of your solution.

\$66889.12

- Your company is considering purchasing an \$80,000 piece of equipment to reduce labor costs and would like to evaluate two options over a four-year period. Assume an annual interest rate of 9% compounded annually, and bring all the costs back to the present (determine the present cost). Draw cash flow diagrams for both options, and identify the best option.

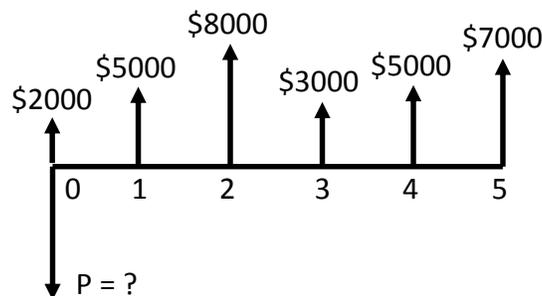
Option 1: Do not purchase the equipment and continue paying current labor costs of \$30,000 per year.

\$97,191.60

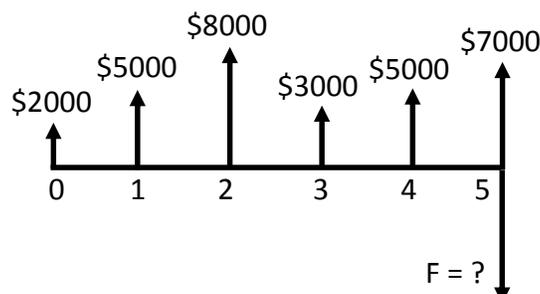
Option 2: Purchase the \$80,000 piece of equipment and reduce labor costs to \$15,000 per year. **\$111,453.45**

- Maintenance costs for the new piece of equipment are \$1,000 for year 1, \$1,500 for year 2, \$2,500 for year 3, and \$5,000 for year 4 (paid out at the end of the year)
- The salvage value of the equipment is estimated at \$35,000 after four years.

- Compute the present amount for the cash flow below, assuming an annual interest rate of 7% compounded monthly over five years. **\$24,773.68**



- Compute the future amount for the cash flow below, assuming an annual interest rate of 7% compounded monthly over five years. **\$35,119.79**



5. **(Due Class 15)** As an engineer in a world that is becoming increasingly “flat,” It is very likely that you will work with people from other cultures during your career. Using the Internet and other sources, learn about cultural differences to help you prepare for these future interactions. A good overview of cultural differences is provided at . . .

<http://www.professionalroofing.net/past/apr00/international.asp>

Pick a country other than your native country and discuss some of the things that you would need to consider when interacting with these people. Write a couple of paragraphs describing what you have learned (about ½ page is fine), and come to class ready to participate in an open discussion on this topic. **We expect you to spend about one hour completing this problem; this is not meant to be an exhaustive study of the topic.**

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

6. Build your second prototype. This prototype should have at least one sensor working and start to show the form and function of your design idea. 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 your second prototype to class. Include a picture of your prototype along with a written description of your second prototype. Also include a brief summary of the next steps your team will take as you move forward with the product.

7. Bring any tools you need to class next time to work on your prototype. Be sure to bring your safety glasses.