

Eastern Oregon University
Homework #2
Engineering Econ.
MATH 323 - Math Modeling

Name: _____

Major: _____

(staple this page to the front of your completed assignment as a cover page)

For each problem, draw the appropriate arrow diagram.

1. Compounded Interest

With an interest rate of 8% compounded semiannually, what is the value of a \$1000 investment after 5 years?

2. Economic Decision Making

It costs \$1000 for hand tools and \$1.50 labor per unit to manufacture a product. Another alternative is to manufacture the product by an automated process that costs \$15,000, with a \$0.50 per-unit cost.

- (a) What is the number of units that need to be manufactured?
- (b) With an annual production rate of 5000 units, how long will it take to reach the break-even point (neglecting the time value of money)?

3. Capitalized Costs

After graduating, you invent the xyz gadget that revolutionizes the world, congratulations! You decide that you want to give back to your undergraduate university by creating an endowed chair. The university assures you that it can get a 5% return on investment each year. If the cost of a college professor is about \$60,000 plus \$20,000 in benefits, how much of a one-time donation is needed to sustain the endowed chair position?

4. Doubling Time

You want an investment to double your money every 8 years (who wouldn't?). What annual interest rate would you need to get to achieve this?

5. The Economics of owning an Orchard

The good life. Your uncle has his property paid off, and a filbert orchard that produces nuts each year. He wants to buy a \$30,000 tractor for his orchard. He estimates that it will cost him about \$500 a year in maintenance and fuel. After 12 years, he plans to sell it and buy a new one. He figures he should be able to get about \$12,000 for it then. The nominal interest rate is 5%.

- (a) What is the Present cost of using the tractor?
- (b) He pays \$1200 per year on property tax. What is the Present Cost of owning the property for the next 12 years?
- (c) He makes \$3000 per year on the harvest, what is the Present Value of the harvest?
- (d) What is the Net Present Value of being in the filbert orchard business (Profit - Cost)?
- (e) What is the Net Annual Value of the business (using A/P on the above)?
- (f) He works about 150 hours a year working on his filbert orchard. Based on this, about how much is he getting for his work and his orchard?