The Time Value of Money

Physics and Mathematics of Sustainable Energy

College of the Atlantic

1. You have $10,000 that you put in a bank account that gets one percent interest. How much money will you have in five years? How much in ten years? How much money will you have in five and ten years if the account gets five percent interest?

2. In 15 years you wish to have $20,000 to use as a down payment for a house. How much money should you deposit in a bank today in order to achieve this goal. Assume an interest rate of 5 percent. How much money would you need to deposit if the interest rate is 7 percent?

3. Suppose that in fifty years someone will give you a million dollars. What is the present value of this gift?

4. You deposit 1,000 Euro in a bank account with an interest rate of 1 percent. How much money do you have in six years? How long does it take to double your money?

5. You are considering an investment that will pay you $2000 for the next three years. For this problem, assume a discount rate of 3%.

   (a) In one year you will receive a payment of $2000. What is the present value of this payment?

   (b) In two years you will receive another payment of $2000. What is the present value of this payment?

   (c) In three years you will receive yet another payment of $2000. What is the present value of this payment?

   (d) What is the total present value of all three of these payments?

6. Repeat problem 5 using a discount rate of 5%.

7. Repeat problem 5 using a discount rate of 7%.

8. Would you buy the investment described in problem 5 for $5700? For $5000?

9. Suppose the investment described in problem 5 cost you $4000. What is the ROI of this investment? What is the payback time?

10. Suppose the investment in problem 5 cost $5450. What would be its IRR? What would its IRR be if the investment cost $5650?

11. You spend $10,000 to install a solar PV system. The cells generate $900 worth of electricity every year for 15 years.

    (a) What is the payback time on the investment?

    (b) What is the ROI?