

Problem Set 1

Problem 1.1. Calculate the PVs of the following cash flows at the given discount rates:

- a. \$80,000 received at the end of year 6, discount rate 11%.
- b. \$120,000 received at the end of year 15, discount rate 4%.
- c. \$40,000 received at the end of year 2, discount rate 6%.

Problem 1.2. Calculate the PVs of the following annuities at the given discount rates:

- a. \$20,000 received at the end of years 1 through 15, discount rate 5%.
- b. \$100,000 received at the end of years 1 through 4, discount rate 15%.
- c. \$65,000 received now and at the end of years 1 through 20, discount rate 6%.

Problem 1.3. Calculate the PVs of the following cash flow streams at the given discount rates:

- a. \$14,000 per year starting at the end of the current year, continuing in perpetuity, discount rate 12%.
- b. \$60,000 at the end of the current year, followed by cash flows at the end of every future year that rise by 2% per year, discount rate 7%.
- c. \$750,000 received at the end of year 1, growing at an annual rate of 4% for years 2 through 12, discount rate 18%.

Problem 1.4. Starting at the end of the current year, you will receive \$10,000 per year for 11 years, but you will have to pay \$50,000 at the end of year 12. Your discount rate is 13%.

- a. What is the PV of these future cash flows?
- b. Suppose the cash flow stream is delayed for six years. What is the PV in this case?

Problem 1.5. You will receive \$300,000 one year from now, followed by cash flows in each succeeding year that decline at an annual rate of 5% for 13 more years. Cash flows then level out and continue in perpetuity. Your discount rate is 9%. What is the PV of these future cash flows?

Problem 1.6. Calculate the PVs of the following cash flow streams at the given discount rates:

- a. \$60,000 at the end of the current quarter, followed by quarterly cash flows at the same level until the end of year 5, discount rate 14% (per year).
- b. \$1,500 at the end of the current month, followed by monthly cash flows that decline at the rate of 1% per month, with the final cash flow received at the end of year 4, discount rate 17% (per year).

Problem 1.7. You will receive cash payments totaling \$500,000, to be spread over the next two years. Your discount rate is 13% per year. Calculate the PVs of the following payment plans.

- a. Equal quarterly payments for two years, starting one quarter from now.
- b. Equal weekly payments for two years, starting one week from now.

Problem 1.8. A new retail outlet can be opened for an initial investment of \$350,000. The store will yield new cash flows of \$60,000 per year for 10 years, after which time it will be closed. There is no scrap value. The OCC is 9%. What is the NPV of this investment?

Problem 1.9. A new oil well can be drilled for \$800,000. The well will yield net cash flow of \$140,000 per year for the first six years. At the end of the sixth year, an added \$90,000 must be invested for secondary recovery, and net cash flows will be \$60,000 per year for years 7 through 10. At the end of year 10 the well must be closed down, at a cost of \$25,000. The OCC is 15%. What is the NPV of this investment?

Problem 1.10. A soap company considers an investment of \$5 million to introduce a new brand. Sales of the brand yield a cash flow of \$1.2 million at the end of the first year. The OCC is 12%.

- a. Positive cash flows are expected to continue in perpetuity, but they will decline at a rate of 8% per year. What is the NPV of this project?
- b. Suppose instead that cash flows continue for 10 years only, still declining at 8% per year. Now what is the NPV?