

BOSTON COLLEGE

S U M M E R S E S S I O N

MFIN102201, Fundamentals of Finance
Boston College Summer Session 2018
Monday and Wednesday 6:00 PM-9:15 PM

Solution to Problem Set 3.

You must read Chapter 5 and 8 before attempting to solve the problem set. The content from the class presentation will not be sufficient to answer the problem set. All questions were selected from the before mentioned chapters.

- 1) New Savings Bank pays 4% interest on its deposits. If you deposit \$1,000 in the bank and leave it there, will it take more or less than 25 years for your money to double?

Less than 25 years thanks to compounded interest. If it were simple interest, each year you would get $4\% \times 1000 = 40$. 40 times 25 years = 1,000.

To get the exact number of years we would solve

$$2000 \text{ (double investment)} = 1000 \times (1+4\%)^{\text{number of years}}$$

$$2 = (1.04)^{\text{number of years}} \sim 17.7 \text{ years}$$

- 2) In 1880 five aboriginal trackers were each promised the equivalent of 100 Australian dollars for helping to capture the notorious outlaw Ned Kelley. In 1993 the granddaughters of two of the trackers claimed that this reward had not been paid. The Victorian prime minister stated that if this was true, the government would be happy to pay the \$100. However, the granddaughters also claimed that they were entitled to compound interest.

- a. How much was each granddaughter entitled to if the interest rate was 4%?

$$100 \times (1.04)^{113} = \$8,409$$

- b. How much was each entitled to if the interest rate was 8%?

$$c. 100 \times (1.08)^{113} = \$598,253$$

- 3) You invest \$1,000 today and expect to sell your investment for \$2,000 in 10 years.

- a. Is this a good deal if the interest rate is 6%?

$$-1000 + 2000 / (1.06)^{10} = 117$$

- b. What if the interest rate is 10%?

$$-1000 + 2000 / (1.1)^{10} = -229$$

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4) You can buy property today for \$3 million and sell it in 5 years for \$4 million. (You earn no rental income on the property.)

a. If the interest rate is 8%, what is the present value of the sales price?

$$4/(1.08)^5 = 2.72$$

b. Is the property investment attractive to you?

No, the Net present value is negative = $3 - 2.72 = -\$0.28$ millions

c. Would your answer to (b) change if you also could earn \$200,000 per-year rent on the property? The rent is paid at the end of each year.

We get the NPV of the cash-flow:

$$-3 + 0.2/1.08^1 + 0.2/1.08^2 + 0.2/1.08^3 + 0.2/1.08^4 + 4.2/1.08^5 = .52$$

As the NPV is positive, the investment is attractive

5) A famous quarterback just signed a \$15 million contract providing \$3 million a year for 5 years. A less famous receiver signed a \$14 million 5-year contract providing \$4 million now and \$2 million a year for 5 years. The interest rate is 10%. Who is better paid?

First: \$11,372,360

Second: $\$4,000,000 + \$7,581,573 = \$11,581,573$ is a better deal

6) A local bank advertises the following deal: "Pay us \$100 a year for 10 years and then we will pay you (or your beneficiaries) \$100 a year forever." Is this a good deal if the interest rate available on other deposits is 6%?

Difficult:

3 steps:

PV of 10 year \$100 annuity = \$765,611

PV of \$100 perpetuity = \$1,666,667

PV of \$100 perpetuity that starts in 10 years = \$ 930,658

We compare \$765,611 to \$930,658 => Yes, it is a good deal

7) Would you rather receive \$1,000 a year for 10 years or \$800 a year for 15 years if the interest rate is 5%? What if the interest rate is 20%?

At 5% = \$7,721,734 vs \$8,303,726

At 20% = \$4,192,472 vs \$3,740,378

8) A factory costs \$400,000. You forecast that it will produce cash inflows of \$120,000 in year 1, \$180,000 in year 2, and \$300,000 in year 3. The discount rate is 12%.

a. What is the value of the factory?

**NPV, or what you would be willing to pay to own this project is
= $-\$400,000 + \$464,171 = \$64,171$**

b. Is the factory a good investment? **Yes, positive NPV**