CHAPTER 2
(readings: chapter 2 of BMA)

1. **Discount factors.** If the PV of $139 is $125, what is the discount factor?

2. **Present values.** If the cost of capital is 9%, what is the PV of $374 paid in year 9?

3. **Present values** A project produces a cash flow of $432 in year 1, $137 in year 2, and $797 in year 3. If the cost of capital is 15%, what is the project's PV? If the project requires na investment of $1,200, what is its NPV?

4. **Present values** A factory costs $800,000. You reckon that it will produce an inflow after operating costs of $170,000 a year for 10 years. If the opportunity cost of capital is 14%, what is the net present value of the factory? What will the factory be worth at the end of five years?

5. **Future values** If you invest $100 at an interest rate of 15%, how much will you have at the end of eight years?

6. **Future values.** In the five years preceding the end of 2016, the price of Amazon shares rose by 34% a year. If you had invested $100 in Amazon at the beginning of this period, how much would you have by the end of the period?

7. **Perpetuities** An investment costs $1,548 and pays $138 in perpetuity. If the interest rate is 9%, what is the NPV?

8. **Growing perpetuities** A common stock will pay a cash dividend of $4 next year. After that, the dividends are expected to increase indefinitely at 4% per year. If the discount rate is 14%, what is the PV of the stream of dividend payments?

9. **Perpetuities and annuities** The interest rate is 10%.

    a. What is the PV of an asset that pays $1 a year in perpetuity?

    b. The value of an asset that appreciates at 10% per annum approximately doubles in seven years. What is the approximate PV of an asset that pays $1 a year in perpetuity beginning in year 8?

    c. What is the approximate PV of an asset that pays $1 a year for each of the next seven years?

    d. A piece of land produces an income that grows by 5% per annum. If the first year's income is $10,000, what is the value of the land?

10. **Future values and annuities**

    a. The cost of a new automobile is $10,000. If the interest rate is 5%, how much would you have to set aside now to provide this sum in five years?

    b. You have to pay $12,000 a year in school fees at the end of each of the next six years. If the interest rate is 8%, how much do you need to set aside today to cover these bills?

c. You have invested $60,476 at 8%. After paying the above school fees, how much would remain at the end of the six years

11. **Present values.** Lofting Snodbury is considering investing in a new boring machine. It costs $380,000 and is expected to produce the following cash flows:

Year:	1	2	3	4	5	6	7	8	9	10
Cash flow ($000s)	50	57	75	80	85	92	92	80	68	50

f the cost of capital is 12%, what is the machine's NPV?

12. **Continuous compounding** The continuously compounded interest rate is 12%.

a. You invest $1,000 at this rate. What is the investment worth after five years?

b. What is the PV of $5 million to be received in eight years?

c. What is the PV of a continuous stream of cash flows, amounting to $2,000 per year, starting immediately and continuing for 15 years?

13. . **Compound interest.** New Savings Bank pays 4% interest on deposits. If you deposit $1,000 in the bank and leave it there, will it take more or less than 25 years for your investment to double? You should be able to answer this without a calculator.

14. **Opportunity cost of capital.** Which of the following statements are true? The opportunity cost of capital:

a. Equals the interest rate at which the company can borrow.
b. Depends on the risk of the cash flows to be valued.
c. Depends on the rates of return that shareholders can expect to earn by investing on their own.
d. Equals zero if the firm has excess cash in its bank account and the bank account pays no interest.

15. **Opportunity cost of capital.** Explain why we refer to the opportunity cost of capital, instead of just "cost of capital" or "discount rate." While you're at it, also explain the following statement: "The opportunity cost of capital depends on the proposed use of cash, not the source of financing."

16. **Present values and opportunity cost of capital.** Halcyon Lines is considering the purchase of a new bulk carrier for $8 million. The forecasted revenues are $5 million a year and operating costs are $4 million. A major refit costing $2 million will be required after both the fifth and tenth years. After 15 years, the ship is expected to be sold for scrap at $1.5 million.

a. What is the NPV if the opportunity cost of capital is 8%?
b. Halcyon could finance the ship by borrowing the entire investment at an interest rate of 4.5%. How does this borrowing opportunity affect your calculation of NPV?

17. **Annuities**. Kangaroo Autos is offering free credit on a new $10,000 car. You pay $1,000 down and then $300 a month for the next 30 months. Turtle Motors next door does not offer free credit but will give you $1,000 off the list price. If the rate of interest is 0.83% a month, which company is offering the better deal?

18. **Annuities due.** The $40 million lottery prize that you have just won actually pays out $2 million a year for 20 years. The interest rate is 8%. If the first payment comes after 1 year, what is the present value of your winnings? What is the present value if the first payment comes immediately?

19. **Growing annuities.** You estimate that by the time you retire in 35 years, you will have accumulated savings of $2 million. If the interest rate is 8% and you live 15 years after retirement, what annual level of expenditure will those savings support?

    Unfortunately, inflation will eat into the value of your retirement income. Assume a 4% inflation rate and work out a spending program for your $2 million in retirement savings that will allow you to increase your expenditure in line with inflation.

20. **Growing perpetuities and annuities.** Your firm's geologists have discovered a small oil field in New York's Westchester County. The field is forecasted to produce a cash flow of C1 = $2 million in the first year. You estimate that you could earn a return of r = 12% from investing in stocks with a similar degree of risk to your oil field. Therefore, 12% is the opportunity cost of capital.

    What is the present value? The answer, of course, depends on what happens to the cash flows after the first year. Calculate present value for the following cases:

    a. The cash flows are forecasted to continue forever, with no expected growth or decline.
    b. The cash flows are forecasted to continue for 20 years only, with no expected growth or decline during that period.
    c. The cash flows are forecasted to continue forever, increasing by 3% per year because of inflation.
    d. The cash flows are forecasted to continue for 20 years only, increasing by 3% per year because of inflation.