ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

# Principles of Finance

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**Assignment 2**

**Instructions**

- Assignments should be done in groups of 3 students.
- You should remain with the same group through the entire course.
- Submit on Moodle only one copy of solutions per group.
- For each assignment you can get a maximum of 100 points.
- All assignments turned in late will not be graded (zero points).

**Due date**
The due date is indicated on Moodle.

1. Which of the following alternatives would you prefer? (10 points)

| Investment | APR | Compounding |
|---|---|---|
| A | 5.20% | Annual |
| B | 5.15% | Daily |
| C | 5.19% | Quarterly |
| D | 5.13% | Monthly |

2. Suppose that two years ago your firm purchased a new delivery truck. Your firm financed the delivery truck for 36 months (with payments made at the end of each month) with a loan at 4.3% APR. The monthly payments are $889.75 and your firm has just made the 24th monthly payment on the delivery truck. (10 points)

   (a) Compute the amount of the original loan taken on the delivery truck.

   (b) What is the outstanding principal balance on the loan if your firm has made all the first 24 payments on time?

3. You need a new car and the dealer has offered you a price of $30,000, with the following payment options: (a) pay cash and receive a $3,000 rebate, or (b) pay a $5,000 down payment and finance the rest with a 0% APR loan over 36 months with monthly payments. But having just quit your job to start an MBA program, you are in debt and you expect to be in debt for at least the next three years. You plan to use credit cards to pay your expenses. Your credit card has a rate of 12% APR (monthly compounding). Which payment option is best for you? (10 points)

4. Suppose a 10-year bond with a face value of $1,000 pays an 8% coupon semi-annually: (10 points)

   (a) How much will each semi-annual coupon payment be?

   (b) Assuming the bond trades for a price of $1,034.74, what is the bond's yield to maturity (expressed as an APR with semi-annual compounding)? You can use Excel solver to find the answer.

   (c) If the bond's yield to maturity changes to 9% APR, what will the bond's price be? Will it be trading at par, discount or premium?

5. Consider the situation where Treasury zero-coupon rates (APR) measured with **continuous** compounding are as follows: The 6-month, 12-month, 18-month, and 24-month zero rates are, respectively, 3%, 4.2%, 5%, and 5.3%. Suppose that a 2-year Treasury bond with a principal of $1,000 provides coupons at the rate of 5% per annum semi-annually. (10 points)

   (a) What is the theoretical market price of this bond?

   (b) What is the **continuously** compounded yield on this bond? You can use Excel solver to find the answer.

6. The US Treasury sells bond at regularly scheduled auctions. The resulting prices are available at www.treasurydirect.gov/instit/annceresult/annceresult_query.htm. The table below lists the quotes for Treasury notes resulting from past auctions:

| CUSIP | Type | Term | Coupon Rate | Auction Date | Issue Date | Maturity Date | Price per $100 |
|---|---|---|---|---|---|---|---|
| 9128284Z0 | Note | 7-Year | 2.750% | 08/29/2018 | 08/31/2018 | 08/31/2025 | 99.407159 |
| 9128284X5 | Note | 5-Year | 2.750% | 08/28/2018 | 08/31/2018 | 08/31/2023 | 99.930401 |
| 9128284Y3 | Note | 2-Year | 2.625% | 08/27/2018 | 08/31/2018 | 08/31/2020 | 99.941940 |
| 9128284V9 | Note | 10-Year | 2.875% | 08/08/2018 | 08/15/2018 | 08/15/2028 | 99.268892 |
| 9128283G3 | Note | 3-Year | 1.750% | 11/07/2017 | 11/15/2017 | 11/15/2020 | 100.000000 |

   Compute the yield to maturity for these 5 notes. (Treasury Notes are US government coupon bonds with fixed maturity of not less than 1 year and not more than 10 years. Coupons are paid semiannually.) Hint: You can use Excel solver. (10 points)

7. ABC Corp. is expected to pay a dividend of $2 per share at the end of this year and a $2.30 dividend per share at the end of the second year. You expect ABC's stock price to be $31 at the end of the two years. ABC's equity cost of capital is 12%. Suppose you plan on purchasing ABC's stock in one year, right after the $2 dividend is paid. You then plan on selling your stock at the end of year two, right after the $2.30 dividend is paid. (10 points)

(a) What is the capital gain rate that you will receive on your investment?

(b) What is the dividend yield that you will receive on your investment?

(c) What is the total return in percent that you will receive on your investment?

8. Suppose ACap Corporation will pay a dividend of $2 per share at the end of this year and $2.5 per share next year. You expect ACap's stock price to be $40 in two years, right after paying the dividend. If ACap's equity cost of capital is 13%: (10 points)

   (a) What price would you be willing to pay for a share of ACap stock today, if you planned to hold the stock for two years?

   (b) Suppose instead you plan to hold the stock for one year. What price would you expect to be able to sell a share of ACap stock for in one year? What price will you be willing to pay for it today? How does this compare to your answer in (a)? Explain.

9. Roybus Inc., a manufacturer of flash memory, just reported that one of its main production facilities was destroyed in a fire. While the plant was fully insured, the loss of production will decrease dividends paid by Roybus by $200 million at the end of this year and by $75 million and $45 million respectively at the end of the next two following years. (10 points)

   (a) If Roybus has 40 million shares outstanding and a cost of capital of 12%, what change in Roybus' stock price would you expect upon this announcement?

   (b) Would you expect to be able to sell Roybus' stock on hearing this announcement and make a profit? Explain.