ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

Principles of Finance

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Assignment 2

Instructions

- Assignments should be done in groups of 2 to 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	6.25%	Annual
B	6.10%	Daily
C	6.125%	Quarterly
D	6.120%	Monthly

2. Suppose that two years ago your firm purchased a new delivery truck. Your firm financed the delivery truck for 60 months (with payments made at the end of each month) with a loan at 5.9% APR. The monthly payments are $617.16 and your firm has just made the 24th monthly payment on the delivery truck. (15 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 $20,000, with the following payment options: (a) pay cash and receive a $2,000 rebate, or (b) pay a $5,000 down payment and finance the rest with a 0% APR loan over 30 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 two and a half years. You plan to use credit cards to pay your expenses. Your credit card has a rate of 15% APR (monthly compounding). Which payment option is best for you? (15 points)

4. Suppose a 10-year bond with a face value of $1,000 pays an 8% coupon semi-annually: (15 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 a four-year, default-free bond with annual coupon payments and a face value of $1,000 that is issued at par. What is the coupon rate of this bond if zero-coupon yields to maturity (YTM) on default-free securities are summarized in the following table? (15 points)

Maturity (years)	1	2	3	4	5
Zero-Coupon YTM	4.0%	4.3%	4.5%	4.7%	4.8%

   Hint: A zero-coupon yield is the yield on a bond that does not pay any coupon over its life and therefore only pays a face value at maturity.

6. 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, 4%, 5.3%, 5.9%, and 6.5%. Suppose that a 2-year Treasury bond with a principal of $100 provides coupons at the rate of 6% per annum semi-annually. (15 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.

7. Consider the following zero-coupon yields on default free securities: (15 points)

Maturity (years)	1	2	3	4	5
Zero-Coupon YTM	4.0%	5.5%	5.5%	5.0%	4.5%

   (a) What is the forward rate for year 2 (the forward rate quoted today for an investment that begins in one year and matures in two years)?

(b) What is the forward rate for year 5?

(c) Suppose you wanted to lock in an interest rate for an investment that begins in one year and matures in five years. What rate would you obtain if there are no arbitrage opportunities?