# Midterm 1

**1.** (12 points) What is the effective annual interest rate in each situation?
a. A savings account with 4% annual interest rate compounded daily (assume a year consists of 365 days)?

b. A savings account with 4% annual interest rate compounded monthly?

**2.** Northwestern's endowment bought a year ago a bond with face value $10,000, paying semiannual coupons at an annual coupon rate of 10%.

**2.1** (5 points) What is the dollar amount of each coupon payment?
(a) $1200
(b) $1000
(c) $600
(d) $500
(e) zero
(f) Something else.
(g) More information is required to answer the question.

**2.2** (10 points) The bond's yield fell by 1.5% (150 basis points) over the last year. This implies that:
a) The value of this bond increased.
b) The value of this bond stayed the same.
c) The value of this bond fell.

**3**. (10 points) You need to invest money for one year and decide to buy a 30-year Treasury bond issued this month with a 5% yield. What risk results from this mismatch of when you need the money and when the bond matures?
a) inflation risk
b) interest-rate risk
c) reinvestment risk
d) credit risk
e) funding liquidity risk

**4**. (10 points) Which type of risk is most relevant for the bond issuer?
a) inflation risk
b) interest-rate risk
c) reinvestment risk
d) credit risk
e) funding liquidity risk

**[More problems are on the back.]**

**5**. (11 points) Consider the following cashflow stream and a bank account paying 3% annual interest. What is the present value? Is the account value ever negative?

| Year | Cashflow |
|---|---|
| 0 | 8 |
| 1 | 2 |
| 2 | 4 |
| 3 | -15 |
| 4 | 16 |

**6.** (24 points) Which of the following cashflows do you most prefer using a discount rate of 10%? Using a discount rate of 1%? Show and explain all supporting calculations!

Cashflow A: receive $10 every year, forever, with the first payment next year
Cashflow B: receive $19 every other year, forever, with the first payment being next year
Cashflow C: pay $5 every year for 20 years, with the first payment being today, and then subsequently receive $30 every year for 20 years.
Cashflow D: receive $70 today and then receive $50 in five years.

**7**. (18 points) Irene Engels recently graduated with an MBA. In August 2007, she borrowed $50,000, and she borrowed another $50,000 in August 2008. Her student loan has an annual interest rate of 2% compounded monthly. Irene doesn't make any payments on her student debt until she starts a lucrative Wall St. job. Then starting in September 2009 she makes a payment of $1000 every month. Now bonus time is coming near. For January 2010 she plans to make another $1000 payment (her $5^{th}$) and also apply her bonus to the debt. How big must her bonus be so that she will have completely paid-off the debt at the end of this January?

**8**. (10 points extra credit) You are analyzing the value of the company Twitter using a 15% discount rate. You expect its cashflows over the next 4 years to be as shown below and you estimate its NPV as $1B. Explain.

| Year | Cashflow |
|---|---|
| 0 | -20M |
| 1 | -10M |
| 2 | 0 |
| 3 | 12M |
| 4 | 40M |