

# DEPARTMENT OF MATHEMATICS

MA162 Chapter 5 Exam (Sample)

July 19, 2010

**DO NOT TURN THIS PAGE UNTIL INSTRUCTED TO DO SO.**

**Instructions:** Be sure that your name, section number, and student ID are filled in below. Cell phones must be OFF and put away before you open this exam. You may use calculators (including graphing calculators, but no laptops or cellphone calculators) for checking numerical calculations, but you must show your work to receive credit. Put your answers in the answer boxes provided, and show your work. If your answer is not in the box or if you have no work to support your answer, you will receive no credit. The test has been carefully checked and its notation is consistent with the homework problems. No additional details will be provided during the exam.

Problem	Maximum	Actual
1	20	
2	20	
3	20	
4	20	
5	20	
Total	100	

Name: \_\_\_\_\_

Section: 020

Last four digits of Student ID: \_\_\_\_\_

## Useful formulas

1. Simple Interest:  $I = Prt$ . Accumulation:  $A = P(1 + rt)$ .
2. Compound Interest Accumulation:  $A = P(1 + i)^n$ . Present value:  $P = A(1 + i)^{-n}$ .
3. Effective rate:  $r_{eff} = (1 + \frac{r}{m})^m - 1$ .
4. Annuity: Sum:  $S = R \frac{((1+i)^n - 1)}{i}$ . Present value:  $P = R \frac{(1 - (1+i)^{-n})}{i}$ .

1. Gary knows that he will need \$18,000 after about 6 years from now to buy new printers for his shop. He also notices that his current savings are not making much money and he decides to invest them in a growth fund to have enough money available after 6 years.

(a) How much would he have to invest now at 8% annual rate compounded annually to have that sum available?

(b) Suppose he finds a better investment opportunity which offers bi-weekly compounding at the same annual rate. Assuming 26 nominal bi-weeks in the year, how much would he need to invest in the new scheme? Be sure to show the formulas used.

2. You are about to finance the purchase of a new house with a 20 year loan of 110 thousand dollars at 3.7% APR compounded monthly.

(a) You are supposed to pay monthly. What is your monthly payment and what is your total of the payments over the period of 20 years?

(b) Suppose that another lender had offered the same loan with the same interest rate but for 30 years instead of 20 years. What will be the new monthly payment and the total of the payments over the period of 30 years?

3. John got a new job and is eager to replace his old car with a new one. But he does not want to take the responsibility of a new car loan. Therefore, he starts putting money into a savings account so he can buy a car after 5 years. John figures that he would need to have \$14,000 saved, and he wishes to make monthly payments into an account paying 4% interest compounded monthly. Help him figure out the following.

(a) How much should John's monthly payment be?

(b) At the end of 5 years, John decides to continue with his old car for another year yet continues making the same payments, so he can get a better car. How much additional money will accumulate into the account?

4. In this problem, assume a 360 day year. “Payday!” will loan you 55% of your paycheck of \$700 for 10 days. After 10 days, you pay back the loan plus an interest of \$24.

(a) Calculate the annual simple interest rate for this service.

(b) Across the street, “Cash Now!” will loan you 5% more of your paycheck but charge you an interest of \$26. Is this a lower rate?

5. You've got \$23 and have found two banks that offer 8% interest. Lenny's Loans and Loot Conversion offers 8% simple interest, and Barry's Bank and Bingo Quarters offers 8% compound interest.

(a) How long would it take your investment to grow to \$100 at Lenny's LLC?

(b) How long would it take your investment to grow to \$100 at Barry's BBQ?