

Fundamentals take home problems.

1. In 1996, administrators at New College of Oxford discovered paperwork showing that King Edward IV of England had borrowed \$384 from the College on July 18, 1461. The King paid back \$160, but never repaid the remaining \$224. A College official wrote to the Queen of England asking for the repayment of the 535 year-old debt – with interest. Assuming an interest rate of 4% per year, what did the official say the Queen owed the College?
2. The official indicated a willingness to settle for a lower interest rate of 2% per year. How much did this come to?
3. You deposit \$5000 in a bank account that pays an APR of 6% and compounds interest yearly. How much will you have after 5 years?
4. How much would you have if the bank compounded interest monthly?
5. How much would you have if the bank compounded interest daily?
6. Continuously?
7. Find the annual percentage yield (APY) of an account with APR of 8% compounded a) quarterly, b) monthly, c) daily and d) continuously.
8. Allen invests \$1600 in an account with APR of 4.5% compounded annually. Frank invests \$1400 with continuous compounding and an APR of 5.5%. What are their balances after 5 years and after 29 years?
9. In December 1995, 101-year-old Anne Scheiber died and left \$22 million to Yeshiva University. It was accumulated through shrewd investment of a \$5000 nest egg over 50 years. Suppose she had simply deposited the money in a high-interest account for which interest was compounded annually. Estimate the interest rate she would have needed to turn \$5000 into \$22 million in 50 years.
10. Suppose you want to have a \$100,000 college fund in 18 years. How much would you have to invest now at an APR of 6% compounded daily? How much at an APR of 7.5% compounded continuously?
11. Suppose you apply for a \$7500 student loan. You will pay \$95 per month for 10 years at an APR of 9%.
 - a) What is the principal of the loan?
 - b) What is the percentage rate?
 - c) What are the monthly payments?
 - d) What is the term of the loan?
 - e) How many payments will you make?
 - f) How much money will you actually pay the lender over the course of the loan?
 - g) Of the total amount you pay, how much of it (in dollar terms *and* in percentage terms) will go toward the interest?
12. Suppose you have a student loan of \$60,000 with an APR of 8% for 25 years.
 - a) What are your monthly payments?
 - b) Suppose that you would like to pay the loan off in 15 years instead of 25. What monthly payments will you need to make?
 - c) Compare the total amounts you'll pay over the course of the loan term if you pay the loan off in 25 years versus 15 years.

13. Imagine that you have lost your mind and run up a credit card balance of \$2500. You come to your senses and decide to pay the balance off in two years while making no more charges. What are your monthly payments if the APR is 20%? What were your total payments?
14. Assume you have a balance of \$1200 on a credit card that carries an APR of 18%, or 1.5% per month. You start making payments of \$200 per month, but also charge an average of \$75 additional per month. The following table shows your monthly balances. Complete the table and extend it until the debt is paid off. How long does it take to pay off the credit card?

Month	Payment	Expenses	Interest	Balance
0	-	-	-	\$1200
1	\$200	\$75	$0.015 \times \$1200 = \18	$1200 - 200 + 75 + 18 = 1093$
2	\$200	\$75		
3	\$200	\$75		

15. Suppose you can afford monthly car payments of \$220 and need to borrow \$10,000 to buy the car you want. The bank offers three choices of car loans with the following rates and terms: 7% for a 3-year loan; 7.5% for a 4-year loan; or 8% for a 5-year loan. Which loan best meets your needs? Why?
16. In the Sunday April 21, 2002 Inquirer, National Future Mortgage advertised the following rates: 30 years at 6.5% no points; 30 year 6% with 3 points; 15 year 6% no points; and 15 year 5.5% with 3 points. Each point is a fee of 1% of the loan, which must be paid up front. For each of the rates above, calculate the monthly payments for a loan of \$100,000. Calculate the monthly savings for the 30-year mortgage with the points, and the monthly savings for the 15-year mortgage with points. How long before you make up the added up-front costs?