MATH 150 Exam I

Fall 2003

Name:

$$F = P\left(1 + \tfrac{r}{n}\right)^{nt} \qquad F = P(1+r)^t$$

$$F = D\left(\frac{\left(1+\frac{r}{n}\right)^{nt}-1}{\frac{r}{n}}\right) \qquad P = R\left(\frac{1-\left(1+\frac{r}{n}\right)^{-nt}}{\frac{r}{n}}\right)$$

1. For the following equations, describe in words the financial scenario presented. Be specific by describing what the known values are and represent and what is to be determined.

   (a) *(5 points)* $\$60,000 = \$500\left(\frac{\left(1+\frac{.08}{4}\right)^{4t}-1}{\frac{.08}{4}}\right)$

   (b) *(5 points)* $P = \$175\left(\frac{1-\left(1+\frac{.12}{12}\right)^{-12*8}}{\frac{.12}{12}}\right)$

2. *(10 points)* I offered my son a loan of $199.00 for a new XBox. I told him I'd charge him 25.8% interest on the loan and that he has to pay it off at a rate of $18.99/month for 1 year. Am I offering my son an amortized loan or a simple (add-on) loan? Prove your answer mathematically.

3. *(5 points)* I offered my other son a loan of $50.00 for a box of Legos. I told him that he has to pay it off at a rate of $7.50/month for 1 year. If this is a simple add-on interest loan, what interest rate am I charging my son?

4. I want to save enough money for college for my son by depositing money into a savings account earning 7% compounded monthly. If I figure I need to save $50,000 for him over 18 years,

   (a) *(10 points)* How much must I deposit each month?

   (b) *(10 points)* How much of the final $50,000 will be principal and how much interest? Give the numbers and draw a pie-chart.

5. *(10 points)* You plan to purchase a house priced at $130,000 in a few years. A conventional mortgage will require you to have 10% of the purchase price for a down payment. You figure you can set aside $250/month in a savings account earning 3.8% interest. How long will it take you to save the down payment?

6. You have finally purchased a house with a 30–year mortgage of $117,000 at 6.5% interest.

   (a) *(10 points)* What is your monthly payment?

(b) *(5 points)* How much total interest will you pay?

(c) *(10 points)* Show the first 3 lines of a monthly amortization schedule for this loan.

(d) *(5 points)* Suppose you made $\frac{1}{2}$ your monthly payment in the middle of the month and the other $\frac{1}{2}$ of your payment at the end of the month. Why would this reduce the term of your loan to less than 30 years?

(e) *(5 points)* After 6 years you decide to sell your house. If inflation was running at 3.5% over those 6 years, how much is your house worth now?

(f) Suppose the monthly payment you calculated in a was the maximum amount a lender would loan to you — i.e., 28% of your monthly salary. Another lender will let you borrow to buy a car but the **combined** monthly payments for your house and car can not exceed 36% of your monthly income.

    i. *(5 points)* How large a monthly car-payment can you afford?

    ii. *(5 points)* If you can get a 4.5% loan for 6 years on a used car, what is the maximum price of a car you can afford with that payment?