Mathematical Concepts — Homework
MAT 117, Spring 2011 — D. Ivanšić

List of Assigned Problems

efou = every fourth

Section	Exercises
11.1	7–23efou, 25, 27, 33–36, 41–57, 63–67odd
11.2	8, 9–23odd, 25, 27, 31–41odd, 45–49odd, 53
11.3	9–17odd, 21–37odd, 41, 43, 44, problems on handout
11.4	9, 11, problems on handout
11.5	11-25odd, 26, problems on handout
11.6	9–25odd, problems on handout
12.1	11–27odd
12.2	3, 5, 7, 8, 11–35odd, 47–51odd, 67–77odd
12.3	6–9, 13–31odd, 35–39odd, 41–46
12.4	9–15odd, 16, 19–27odd, 37–43odd, 55, 57
12.5	7–15odd, 19, 23, 27, 29
12.6	11–47odd, 57–60, 71–84, 93–102
12.7	5–33odd, 47–52, 59–64
13.2	3–11, 13–19odd
13.3	7, 9, 11, 19, 27, 31
13.4	9–25odd
13.5	11–21odd, 23, 26, 27, 33, 37, 39, 43–51odd
13.6	10, 11, 13, 15–29odd, 30
13.7	9–12, 17–25odd, 27—47odd, 49–70
15.1	11, 13, 21–24, 39, 41
14.1	9–13odd, 15–20, 21–39odd
14.2	3–5, 11–16, 25–29odd, 33–43odd
14.3	4–6, 9–19odd, 21–31odd
14.4	7–33odd

Section 11.3

1. Suppose you deposited $2,500 into an account that compounds quarterly. After three-and-a-half years, you have $3,214.81 in the account. What is the annual interest rate on this account?

2. Today, Seth buys stock of Boeing corporation at $70 per share. He hopes to sell it in 4 years at $150 per share. What annual compound interest rate would this growth correspond to?

3. Carl and Kathy Minieri hope to retire and believe they will need to have $200,000 in savings (in addition to income from their retirement plans). They have $50,000 now that they can invest into an account with 6.25% interest, compounded semi-annually. How long will they have to wait to reach their target in savings?

4. Carla has the opportunity to invest into an account with 7.55% interest, compounded monthly. How long would she have to wait for the investment to double?

Section 11.6

5. The Carlsons would like to save up for a new $26,000 piano. They can deposit $400 every month into an account bearing 5% interest, compounded monthly. How long will it take them to have necessary amount? Answer the same question if they can deposit $800 every month. Will it take half as long?

6. In order to save up for a town beautification project costing $345,000, the 125 households of Webeegud have decided to each deposit $100 every quarter into an account bearing 4.25% interest, compounded quarterly. How long will it take them to save for the project?

Sections 11.4, 11.5

Instead of the method described in sections 11.4 and 11.5 in the book, we will use the following formula to compute payments on a loan:

$$P = m\frac{1 - \left(1 + \frac{r}{n}\right)^{-nt}}{\frac{r}{n}},$$

where P is the principal (loan amount), n is the number of payments per year, r is the interest rate and m is the payment.

To find the payoff amount for a loan, we use the following fact: the amount owed equals the present value P of the remaining payments.

Example. The Graystones obtained a 15-year loan for \$300,000 at 5.875%, compounded monthly. Using the above formula, we have:

$$300,000 = m \frac{1 - \left(1 + \frac{.05875}{12}\right)^{-12 \cdot 15}}{\frac{.05875}{12}}, \quad \text{that is,} \quad 300,000 = m \cdot 119.4574014,$$

which easily solves to get the monthly payment $m =$ \$2511.36.

If the Graystones paid off their loan after their 123rd payment, the remaining number of payments is 180-123=57. Since nt in the formula represents the number of payments, the payoff amount is calculated using the same formula with 57 in for nt. Thus, the payoff amount is:

$$P = 2511.36 \cdot \frac{1 - \left(1 + \frac{.05875}{12}\right)^{-57}}{\frac{.05875}{12}} = 2511.36 \cdot 49.63243049 = 124,644.90$$

7. Mr. and Mrs. Chan bought furniture at a cost of \$3450. They paid 25% down and financed the rest for 24 months with a 6% loan, compounded monthly.
a) What is their monthly payment?
b) What would be their monthly payment be if the furniture cost twice as much, everything else being the same?
c) What total finance charge did the Chans pay?

8. The Nicols would like to buy a house, and figure they can afford a monthly mortgage payment of \$1100. If they can obtain a loan for 20 years at 5.125%, what is the greatest amount that they can borrow? Assuming they can afford a 10% down payment, what is the most expensive home they can buy?

9. Ann Hernandez borrowed \$10,000 using a loan for 5 years with a 4.75% interest rate, compounded quarterly. She makes quarterly payments on the loan.
a) What is her quarterly payment?
b) Having won a little money on the lottery, Ann wishes to repay the loan after her 12th payment. What amount is due to pay off the loan?

10. Lauren Morse bought a \$289,000 condo a while ago. She made a 10% down payment, and got a loan for the remainder, at 6.5% interest over 30 years, compounded monthly . In the meantime, interest rates have dropped, and Lauren decided to refinance. She refinances after her 66th payment, using a loan for 25 years at 5% interest.
a) What is the monthly payment on the first loan?
b) What amount pays off the first loan after the 66th payment?
c) If the bank charges her \$3,500 to refinance the loan, which Lauren adds to the principal of the second loan, what is the monthly payment on the second loan?
d) How much would Lauren have paid over 30 years had she kept the first loan?
e) How much will Lauren pay with the combination of the two loans, as described?