MA 15200 Supplemental Worksheet, Lesson 39

For the following formulas: S is future value, P is present value, r is the annual interest rate, k is the number of compounding periods in a year, t is time in years, A is the amount of money, and R is the amount of payment; with the formula for the periodic interest rate $i = \dfrac{r}{k}$.

It is possible a formula from the previous lesson may also be used for these problems.

9. Future Value of an Annuity: $\quad S = R\left[\dfrac{(1+i)^{kt} - 1}{i}\right]$

(The amount at the end for an ordinary annuity with regular payments.)

10. Present Value of an Annuity: $\quad P = R\left[\dfrac{1-(1+i)^{-kt}}{i}\right]$

(The present value of an ordinary annuity with regular payments.)

11. 'Sinking Fund' Payment for an Annuity: $\quad R = \dfrac{Si}{(1+i)^{kt} - 1}$

(The amount of a payment that will provide a future value of an ordinary annuity.)

1) What regular payment should be made quarterly to provide $20,000 in 10 years at an annual rate of 6% compounded quarterly? Round to the nearest cent.

2) Hank's regular $1200 quarterly contributions to his retirement fund have earned 6.5% annual interest, compounded quarterly, since he started saving 25 years ago. How much is in his account now? Round to the nearest dollar.

3) What is the present value of an ordinary annuity where payments of $800 are made monthly, the annual interest rate is 4.92%, compounded monthly, for 15 years? Round to the nearest cent.

4) Instead of receiving an annuity of $12,000 every 6 months for the next 15 years, a young woman, Grace, would like a one-time payment, now. Assuming the annual interest rate is 8 ½ %, compounded semiannually, what would be a fair amount? Round to the nearest dollar.

5) Marvin plan to invest $4000 at an annual interest rate of 2 ¼ % compounded semiannually. How much will be in the account in 8 ½ years? Assume he makes no additional deposits or withdrawals. Round to the nearest cent.

6) A company's new corporation headquarters will be completed in 1 ½ years. At that time, $800,000 will be needed for office equipment. How much should be

invested monthly to fund this expense? Assume 9.8% annual interest, compounded monthly. Round to the nearest dollar.

7) Which account will require the lower **annual** contributions to fund a $15,000 obligation in 20 years? How much lower? Bank A offers 5.5% annual interest rate compounded annually with annual payments. Bank B offers a 5.25% annual interest rate compounded monthly with monthly payments. Hint: You will have to determine a year's worth of payments for the monthly payments account.

8) The Lucas family begins saving for next year's vacation. They family decides to put away $250 a month in an account paying 3.2% annual interest compounded monthly. How much will the family have for their vacation in 1 year (to the nearest dollar)?

9) To fund Jerry's lottery winnings of $5000 a month for the next 20 years, the lottery commission needs to make a single deposit now. If they can invest at 9.6% annual interest rate compounded monthly, what amount should the deposit equal? Round to the nearest dollar.

10) Laura and Lynn were arguing concerning who had the better deal from their banks for their investments. Laura said she was investing her money at 4.5% compounded quarterly. Lynn said she was investing her money at 4.4% compounded monthly. Who is the winner of the argument? Why? Hint: Compare interest rates.

11) Joel wants to invest some money now at 6% annual interest rate compounded daily that equals $10,000 in 12 years. How much money should he invest? Round to the nearest dollar.

12) For their first grandchild, Bob and Linda Green begin depositing $500 every 3 months into a 'college' account. Assume they are earning 4.4% annual interest and it is compounded quarterly. How much money will the grandchild have in 18 years? Round to the nearest cent.

Hint for one of the online problems: For number 5 of the online homework for this lesson, you will need to find the amount of the annual payment. You also assume that the interest is compounded annually.