

MA 15200 or MA 15200X Supplemental Worksheet, Lesson 38

Formulas that may be used (found on the course formula sheet):

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

$$i = \frac{r}{k}.$$

5. Future Value of an Investment with **continuously compounded** interest: $S = Pe^{rt}$

(The amount at the end of an investment when an amount P is allowed to grow with interest compounded continuously.)

6. Future Value of an Investment: $S = P(1+i)^{kt}$

(The amount at the end of an investment when an amount P is allowed to grow.)

7. Present Value of an Investment: $P = S(1+i)^{-kt}$

(The amount that must be invested now to provide for a future value.)

8. Effective Rate of Interest: $E = (1+i)^k - 1$

(The effective rate for an account.)

- 1) George can invest in an account paying an annual interest rate of $12\frac{1}{2}\%$ compounded semiannually. What is the periodic interest rate (as a percent)?
- 2) Find the effective interest rate for an account with an annual interest rate of $9\frac{1}{4}\%$ compounded quarterly. Round to the nearest hundredth of a percent.
- 3) Susan has a choice of investing \$15,000 with Citywide Bank or Cornerstone Bank. Citywide offers her a 3.6% annual interest rate compounded monthly. Cornerstone offers her a 3.8% annual interest rate compounded semiannually. Compare the effective rates of interest (rounded to the nearest hundredth of a percent). Which bank offers Susan the better investment option?
- 4) John invested \$2500 in an account that paid 6.45% annual interest compounded semiannually. He let the account grow for 4 years, and then withdrew \$1500 from the account. The remaining money was reinvested at 7.1% annual interest compounded quarterly. How much money (to the nearest dollar) was in that account after 3 years? Assume no additional deposits or withdrawals were made.
- 5) How much (to nearest cent) would Julie have to invest now in order to have \$10,000 in 10 years? Assume she can invest at 3.2% annual rate compounded monthly.

- 6) When Henry retires in 10 years, he expects to supplement his social security with money earned on an investment he is making today. He will be investing \$150,000 that earns an annual interest of $7\frac{1}{2}\%$ compounded quarterly. If he retires in 10 years, how much will that account equal? Round to the nearest dollar.
- 7) Sam and his wife, Leslie, would like to make a \$50,000 down payment on a home in 5 years. What investment would they have to make now, if the annual interest rate is $2\frac{1}{2}\%$ compounded monthly? Round to the nearest dollar.
- 8) Luke invested \$2000 4 years ago. His account has been earning 4% annual interest compounded semiannually. During this 4 year period, how much **interest** (to the nearest cent) has he earned?
- 9) Adam's bank told him an investment was earning an annual interest of $2\frac{1}{4}\%$. However, this investment is compounded monthly. How much higher is the effective rate of interest? Round each percent to two decimal places.
- 10) Craig borrows \$1200 for an unexpected car repair. He arranges to repay the loan in 90 days (3 months) at an annual interest rate of 12% with interest compounded daily. How much will he owe the bank in 90 days? Round to nearest cent.
- 11) Which account earns more in 5 years? An investment of \$5000 earning 8% annual interest compounded continuously or an investment of \$5000 earning 8.2% compounded quarterly. How much more?