Summer Session, Worksheet Lesson 28

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.)

9. **Future Value** of an Annuity: $S = R\left[\frac{(1+i)^{kt} - 1}{i}\right]$
   (The amount at the end for an ordinary annuity with regular payments.)

1) George can invest in an account paying an annual interest rate of 12 ½ % 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 ¼ % 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 ½ % 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 ½ % 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 ¼ %. 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?

12) 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.

13) 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.

14) 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)?