Chapter 4 Worksheet

Directions: This worksheet covers sections 4B – 4E of your textbook. Do every problem listed in this worksheet. **NEATLY SHOW ALL WORK. Provide explanations if requested. Clearly indicate your answers for each question.** *This worksheet is good practice for the exam questions over chapter 4!* ALL OF THESE ARE SOLVABLE WITHOUT A CALCULATOR UNLESS OTHERWISE NOTED. **ANSWER ALL QUESTIONS ON A SEPARATE SHEET OF PAPER!**

1. Does this make sense? Give a brief explanation. Rachael calculated that, with continuous compounding, she would earn an optimum APY of 15% on her account. However, she was very clever and found a way to earn 18% APY on her account by increasing the number of compounding periods per year without modifying the account's APR.

                   MAKES SENSE   DOES NOT MAKE SENSE

   Here's my explanation:

2. Ralph deposits 100 USD in a bank account paying 5% simple interest yearly. How much will he have in his account at the following times. SHOW ALL WORK!
   a. 1 year:
   b. 2 years:
   c. 10 years:

3. In problem number two, what will Ralph earn in INTEREST at each of the given times?
   a. Interest after 1 year:
   b. Interest after 2 years:
   c. Interest after 10 years:

4. Use your answers from problems 2 and 3 to answer the following questions. Why?
   a. What will Ralph's principal be after year 1?
   b. What will Ralph's principal be after year 10?

5. Calculate the following, SHOWING UNITS AND WORK
   a. 5% interest on 1000 USD
   b. 10% interest on 1000 HKD
   c. 25% interest on 2000 USD

6. You purchase an item costing $50.00 from a mail-order catalog. The directions on the order form say for residents of your state to add 5% sales tax on the item's cost. Answer the following questions showing all work.
   a. How much sales tax do you owe on this item?
   b. How much does the item cost including sales tax? Ignore shipping costs.

7. You charge $1000 to your credit card. Your card company charges you an APR of 24%. Answer the following showing work where appropriate:
   a. What percentage of interest will you owe each month assuming interest on the card is compounded monthly?
   b. What percentage of interest will you owe each year if interest on the card is compounded yearly?
   c. Assume interest is compounded on the card every 4 months. How many compounding periods are there in each year?

8. You invest $1000 in an account that pays simple interest of 2% for 30 years. Determine how much money you have in your account after 30 years, how much interest you have earned, and how much of the total money in the account is principal. SHOW ALL WORK AND LABEL YOUR ANSWERS.

9. In problem number 8, what will happen to your earned interest if you invest at 2% simple interest for 29 years? Does the interest increase, decrease, or stay the same? How does the change in the number of years influence the principal in the account?

10. Simple interest is an example of what? Answer on a separate sheet of paper.
    a. Compound growth
    b. Exponential growth
    c. Linear growth
    d. APY optimization
    e. Continuous compounding
11. Compound interest is an example of what? Answer on a separate sheet of paper.
    a. Compund growth
    b. Exponential growth
    c. Linear growth
    d. APY optimization
    e. Continuous compounding
12. Explain a few (at least two) differences between SIMPLE INTEREST and COMPOUND INTEREST.

13. When are the APR and the APY guaranteed to be the same? Answer on a separate sheet of paper.
    a. When you earn exactly K% interest compounded K times per year
    b. Whenever we compound an even number of times per year
    c. Whenever we compound interest once per year
    d. This can't happen, the APR is ALWAYS greater than the APY
    e. This can't happen, the APR is ALWAYS less than the APY

14. You have a 30 year fixed- rate mortgage on a home. (A mortgage is just a loan.) Set up the loan payment formula with the details of the loan so that you could find the regular payment amount due per month that would wipe out this loan in 30 years. You don't have to compute the regular payment amount…just set up the formula
    Your loan is for $150,000
    The fixed-rate APR is 6.55%
    Payments are due monthly

15. What formula would you use in each of the following cases? Your choices are: Interest Compounded Continuously, Interest Compounded n times per year, Simple Interest per year, Loan Payment Formula for Installment Loans, Annual Return, Total Return
    a. You calculate the interest you will earn on a bond over a period of 5 years

    b. You deposit money in a bank account earning interest compounded every day

    c. You sell some stocks and want to know the relative change in your investment value at the time you sold it compared to when you bought it

    d. You are considering retirement in 35 years and want to start saving. You decide you'll deposit a fixed amount of money per month into the savings account for the next 35 years…however you are not sure how much money you'll have at the end of the 35 year period. Which formula will tell you? Assume you know the APR of the savings account you are using.

    e. You have a credit card that you want to pay of in 5 years with regular monthly payments. Which formula should you use?

    f. You take out a 10 year loan of $10,000 and need to pay back that money in weekly installments. Which formula would you use to determine your installment payments?

16. Takahashi invested 1,500,000 yen in Toyota stocks in 2000 by purchasing 1,000 shares. At the end of 2007, he sold those shares for 2,000 yen per share. Answer the following:

a. What was the absolute change in Takahashi's investment from 2000 to 2007? Did he make a profit off of his investment? SHOW ALL WORK.

b. What was the relative change in his investment from 2000 to 2007? SHOW ALL WORK.

c. What was his annual return on investment? (Just set up the formula and simplify any fractions. You needn't calculate the percentage.)

17. A bond is selling at 200 points. With a face value of 500 dollars, what is the bonds current market value? What will the current yield be on the bond if you buy it at this current market value? Assume the bond has a coupon rate of 10%. **Warning: this is a multi-step problem. Show all work and be organized. Clearly mark your answers!**

18. ALGEBRA: Solve for the specified variables. SHOW ALL STEPS.
    a. $2x + 3 = 5$ SOLVE FOR x

    b. $5y - 6 = y + 6$ SOLVE FOR y

    c. $\sqrt{R} = 11$ SOLVE FOR R

    d. $\sqrt[5]{5 + b} = 1$ SOLVE FOR b

    e. $\frac{2}{3}b + 4c = 16$ SOLVE FOR c

    f. Solve the equation in part e for the variable b

    g. Solve the LOAN PAYMENT FORMULA FOR P (the principal)

    h. $\dfrac{\sqrt{2} + c}{7} = \dfrac{1}{14}$

19. The following describes Karen's finances. She is single without any dependants. Do the following using the given information. BE CAREFUL! READ SECTION 4E!
    Wages: $50,000
    Tips: $300

Taxes paid to local governments: $700
Charitable donation to the Red Cross: $100
Earnings on stock dividends: $1000
Exemptions totaling $500
Contribution to IRA: $1500
Interest on a home mortgage: $3,500
Karen will claim one exemption on her taxes for herself.
Karen has a $500 dollar tax credit.

a. Use the Marginal Tax Rates chart on the formula sheet to determine what standard deduction Karen is entitled to. Should she itemize her deductions? EXPLAIN WHY AND SHOW ALL WORK!
b. Determine Karen's GROSS INCOME.
c. Determine Karen's ADJUSTED GROSS INCOME.
d. Determine which marginal tax bracket Karen belongs to.
e. Calculate Karen's marginal taxes owed. Set the problem up like I did in class. Then, using a calculator, determine what she owes in taxes to the Federal government.
f. Is the answer in part 'e' how much she really needs to send to the Federal government? If not, what does she really owe? Explain your answer.

20. Frank is married and he has 3 children. If he and his wife file jointly, what tax bracket will he and his wife fall in if his taxable income is $50,000 and his wife's taxable income is $55,000? BE CAREFUL IN THE PREVIOUS COMPUTATION! Assuming Frank and his wife have no tax credits to claim, set up the computation of their marginal taxes. Set the problem up like I did in class. YOU NEED NOT COMPUTE THE RESULTING AMOUNT, JUST SET UP THE PROBLEM.