

1. Time Value of Money Drill Problems

Find the accumulated amount of an ordinary annuity with cashflows of \$600.00 paid quarterly for 5 years at the interest rate of 9.30% per year, provided the interest is compounded quarterly. _____

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$$600 \frac{(1 + 0.093/4)^{4*5} - 1}{0.093/4}$$

2. Time Value of Money Drill Problems

Find the accumulated amount if \$2,750.00 is invested at the interest rate of 1.10% per year for 7 years, provided the interest is compounded weekly. _____

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$$2750 * (1 + 0.011/52)^{7*52}$$

3. Time Value of Money Drill Problems

Find the accumulated amount of an ordinary annuity with cashflows of \$750.00 paid quarterly for 14 years at the interest rate of 6.40% per year, provided the interest is compounded quarterly. _____

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$$750 * \frac{(1 + 0.064/4)^{4*14} - 1}{0.064/4}$$

4. Compound Interest, Accumulated Value

Find the accumulated amount if \$6,500.00 is invested at the interest rate of 6.90% per year for 13 years, provided the interest is compounded quarterly. _____

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$$6500 * (1 + 0.069/4)^{4*13}$$

5. Compound Interest, Present Value

Find the present value of \$5,500.00 due in 6 years at the interest rate of 10.10% per year, provided the interest is compounded semi-annually. _____

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$$\frac{5500}{(1 + 0.101/2)^{2*6}}$$

6. Annuities, Accumulated Value

Find the accumulated amount of an ordinary annuity with cashflows of \$675.00 paid monthly for 12 years at the interest rate of 8.80% per year, provided the interest is compounded monthly. _____

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$$675 * \frac{(1 + 0.088/12)^{12*12} - 1}{0.088/12}$$

7. Annuities, Present Value

Find the present value of an ordinary annuity with cashflows of \$425.00 paid monthly for 6 years at the interest rate of 6.10% per year, provided the interest is compounded monthly. _____

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$$425 * \frac{1 - (1 + 0.061/12)^{-12*6}}{0.061/12}$$

8. Loan Amortization

Find the periodic payment needed to amortize a loan of \$118,000.00 over 4 years if the payments are made monthly and the interest charged is 11.60% per year compounded monthly. _____

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$$\frac{118000}{\frac{1-(1+0.116/12)^{-12*4}}{0.116/12}}$$

9. Time Value of Money Drill Problems

Find the present value of \$6,250.00 due in 4 years at the interest rate of 2.10% per year, provided the interest is compounded quarterly. _____

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$$\frac{6250}{(1+0.021/4)^{4*4}}$$

10. Time Value of Money Word Problem Practice

Jon wishes to invest some money to save for their college education. Jon has found an investment which promises to pay 11.00% per year compounded annually. Jon figures they will need \$40,000.00 in 18 years for their college education. How much should be invested now in order to have \$40,000.00 available in 18 years? _____

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$$\frac{40000}{(1+0.11/1)^{18*1}}$$

11. Multiple Payment Problem, Present Value This problem is similar to the multiple payment example from Dec 02 lecture slides

You are scheduled to make several payments over the next several years to pay off a debt.

- You plan on paying \$1,500.00 at the end of 2015.
- You plan on paying \$3,250.00 at the end of 2018.
- You plan on paying \$3,000.00 at the end of 2022.
- You plan on paying \$2,000.00 at the end of 2025.
- You plan on paying \$2,500.00 at the end of 2026.

How much would you need to pay back at the beginning of 2014 in order to pay off the entire debt, assuming the account earns 5.60% interest per year, compounded quarterly? _____

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$$\frac{1500}{(1+0.056/4)^{4*2}} + \frac{3250}{(1+0.056/4)^{4*5}} + \frac{3000}{(1+0.056/4)^{4*9}} + \frac{2000}{(1+0.056/4)^{4*12}} + \frac{2500}{(1+0.056/4)^{4*13}}$$

12. Multiple Payment Problem, Accumulated Value This problem is similar to the multiple payment example from Dec 02 lecture slides

- You start a savings account at the beginning of year 2003 by depositing \$15,000.00.
- You deposit \$2,750.00 at the beginning of 2007.
- You withdrew \$1,750.00 at the beginning of 2009.
- You withdrew \$3,250.00 at the beginning of 2010.
- You withdrew \$2,000.00 at the beginning of 2013.

Determine the accumulated value of the account at the beginning of 2014, assuming the account earns 0.50% interest per year, compounded daily. _____

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$$15000(1+0.005/365)^{365*11} + 2750(1+0.005/365)^{365*7} - 1750(1+0.005/365)^{365*5} - 3250(1+0.005/365)^{365*4} - 2000(1+0.005/365)^{365*1}$$

13. Variable Interest Rate Problems

You invested \$12,000.00 in HRT stock at the beginning of 2011. In 2011, the value decreased by 15.00%. In 2012, the value decreased by 25.00%. In 2013, the value decreased by 25.00%. In 2014, the value increased by 5.00%. Determine the value of the stock at the end of 2014. _____

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$$12000(1 - 0.15)(1 - 0.25)(1 - 0.25)(1 + 0.05)$$

14. Variable Interest Rate Problem, Present Value Form This problem is similar to the variable interest rate example from Dec 02 lecture slides

You deposited an amount of money into a bank account at the beginning of 2007.

- The account earned 1.20% nominal interest per year compounded 6 times per year from the beginning of 2007 to the beginning of 2008.
- The account earned 5.80% nominal interest per year compounded quarterly from the beginning of 2008 to the beginning of 2009.
- The account earned 8.80% nominal interest per year compounded semi-annually from the beginning of 2009 to the beginning of 2011.
- The account earned 8.80% nominal interest per year compounded weekly from the beginning of 2011 to the beginning of 2012.
- The account earned 7.40% nominal interest per year compounded monthly from the beginning of 2012 to the beginning of 2014.

The accumulated value of the account at the beginning of 2014 is \$11,000.00. Determine the initial amount that was invested.

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$$11000(1 + 0.012/6)^{-6*1}(1 + 0.058/4)^{-4*1}(1 + 0.088/2)^{-2*2}(1 + 0.088/52)^{-52*1}(1 + 0.074/12)^{-12*2}$$

15. Variable Interest Rate Problems, Accumulated Value This problem is similar to the variable interest rate example from Dec 02 lecture slides

You deposited \$17,000.00 in a bank account at the beginning of 2004.

- The account earned 8.00% nominal interest per year compounded annually from the beginning of 2004 to the beginning of 2006.
- The account earned 9.80% nominal interest per year compounded quarterly from the beginning of 2006 to the beginning of 2007.
- The account earned 5.60% nominal interest per year compounded weekly from the beginning of 2007 to the beginning of 2010.
- The account earned 10.20% nominal interest per year compounded quarterly from the beginning of 2010 to the beginning of 2012.
- The account earned 6.60% nominal interest per year compounded annually from the beginning of 2012 to the beginning of 2014.

Determine the accumulated value of the account at the beginning of 2014. _____

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$$17000(1 + 0.08/1)^{1*2}(1 + 0.098/4)^{4*1}(1 + 0.056/52)^{52*3}(1 + 0.102/4)^{4*2}(1 + 0.066/1)^{1*2}$$

16. Complex Word Problems This problem is similar to the *Saving for College* example from the Dec 04 lecture notes.

Juan just turned 33 years old and wants to start saving for retirement. He plans on retiring as soon as he turns 65 years old. He decides that he needs to save enough so that he can withdraw \$35,000.00 at the end of each year for 20 years, beginning at age 65. To save for retirement, needs to determine how much he needs to invest at the end of each year for the next 32 years. How much does Juan need to invest each year for the next 32 years, assuming the deposits earn interest at 10.00% per year compounded annually?

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$$35000 * \frac{\frac{(1+0.1)^{20}-1}{0.1}}{\frac{1-(1+0.1)^{-32}}{0.1}}$$

17. Complex Word Problems This problem is similar to number 5 on the 5.2 WebAssign HW. It is also related to the *Financing A Home* example from Dec. 04 lecture slides

John just turned 33 years old and wants to start saving for retirement. He plans on retiring as soon as he turns 65 years old. He decides to invest \$2,600.00 into an IRA (individual savings account) at the end of each year for the next 32 years. How much will John have saved for retirement, assuming the deposits earn interest at 12.50% per year compounded annually?

Suppose that John had already saved \$34,000.00 in their IRA by the time he turned 33. How much will they have saved for retirement now? (Consider both amount already saved and the annual deposits from the first part of the problem.) _____

Correct Answers:

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$$2600 * \frac{(1 + 0.125)^{32} - 1}{0.125}$$

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$$34000 * (1 + 0.125)^{32} + 2600 * \frac{(1 + 0.125)^{32} - 1}{0.125}$$