

1. Time Value of Money Drill Problems

Find the present value of an ordinary annuity with cashflows of \$950.00 paid 6 times per year for 6 years at the interest rate of 3.00% per year, provided the interest is compounded 6 times per year. _____

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$$950 \frac{1 - (1 + 0.03/6)^{-6*6}}{0.03/6}$$

2. Time Value of Money Drill Problems

Find the present value of \$4,250.00 due in 6 years at the interest rate of 3.90% per year, provided the interest is compounded daily. _____

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$$\frac{4250}{(1 + 0.039/365)^{6*365}}$$

3. Time Value of Money Drill Problems

Find the present value of \$10,750.00 due in 9 years at the interest rate of 7.20% per year, provided the interest is compounded monthly. _____

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$$\frac{10750}{(1 + 0.072/12)^{9*12}}$$

4. Compound Interest, Accumulated Value

Find the accumulated amount if \$4,250.00 is invested at the interest rate of 1.00% per year for 7 years, provided the interest is compounded monthly. _____

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$$4250 * (1 + 0.01/12)^{12*7}$$

5. Compound Interest, Present Value

Find the present value of \$6,750.00 due in 12 years at the interest rate of 0.70% per year, provided the interest is compounded 6 times per year. _____

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$$\frac{6750}{(1 + 0.007/6)^{6*12}}$$

6. Annuities, Accumulated Value

Find the accumulated amount of an ordinary annuity with cashflows of \$225.00 paid weekly for 6 years at the interest rate of 10.00% per year, provided the interest is compounded weekly. _____

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$$225 \frac{(1 + 0.1/52)^{52*6} - 1}{0.1/52}$$

7. Annuities, Present Value

Find the present value of an ordinary annuity with cashflows of \$575.00 paid semi-annually for 11 years at the interest rate of 9.00% per year, provided the interest is compounded semi-annually. _____

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$$575 * \frac{1 - (1 + 0.09/2)^{-2*11}}{0.09/2}$$

8. Loan Amortization

Find the periodic payment needed to amortize a loan of \$52,000.00 over 10 years if the payments are made 6 times per year and the interest charged is 5.60% per year compounded 6 times per year. _____

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$$\frac{52000}{\frac{1-(1+0.056/6)^{-6*10}}{0.056/6}}$$

9. Time Value of Money Drill Problems

Find the accumulated amount of an ordinary annuity with cashflows of \$1,200.00 paid annually for 7 years at the interest rate of 3.50% per year, provided the interest is compounded annually. _____

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$$1200 * \frac{(1+0.035)^7 - 1}{0.035/1}$$

10. Time Value of Money Word Problem Practice

Juan wishes to invest some money to save for a trip to the Bahamas in 3 years. Juan can invest money at 6.50% per year compounded semi-annually. Juan is going to make deposits of \$2,000.00 at the end of each half year for the next 3 years. How much will Juan have available for their trip? _____

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$$2000 * \frac{(1+0.065/2)^{2*3} - 1}{0.065/2}$$

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 \$2,250.00 at the end of 2017.
- You plan on paying \$3,250.00 at the end of 2019.
- You plan on paying \$1,750.00 at the end of 2020.
- You plan on paying \$1,500.00 at the end of 2022.

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 3.00% interest per year, compounded weekly? _____

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$$\frac{2250}{(1+0.03/52)^{52*4}} + \frac{3250}{(1+0.03/52)^{52*6}} + \frac{1750}{(1+0.03/52)^{52*7}} + \frac{1500}{(1+0.03/52)^{52*9}}$$

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 2006 by depositing \$24,000.00.
- You deposit \$3,250.00 at the beginning of 2010.
- You deposit \$3,500.00 at the beginning of 2012.

Determine the accumulated value of the account at the beginning of 2014, assuming the account earns 11.10% interest per year, compounded monthly. _____

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$$24000(1+0.111/12)^{12*8} + 3250(1+0.111/12)^{12*4} + 3500(1+0.111/12)^{12*2}$$

13. Variable Interest Rate Problems

You invested \$15,000.00 in HRT stock at the beginning of 2012. In 2012, the value increased by 15.00%. In 2013, the value decreased by 30.00%. In 2014, the value decreased by 15.00%. Determine the value of the stock at the end of 2014. _____

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$$15000(1+0.15)(1-0.3)(1-0.15)$$

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 2008.

- The account earned 9.60% nominal interest per year compounded semi-annually from the beginning of 2008 to the beginning of 2009.
- The account earned 9.80% nominal interest per year compounded weekly from the beginning of 2009 to the beginning of 2012.
- The account earned 1.00% nominal interest per year compounded annually from the beginning of 2012 to the beginning of 2014.

The accumulated value of the account at the beginning of 2014 is \$15,000.00. Determine the initial amount that was invested.

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$$15000(1 + 0.096/2)^{-2*1}(1 + 0.098/52)^{-52*3}(1 + 0.01/1)^{-1*2}$$

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

You deposited \$25,000.00 in a bank account at the beginning of 2003.

- The account earned 7.80% nominal interest per year compounded weekly from the beginning of 2003 to the beginning of 2006.
- The account earned 11.00% nominal interest per year compounded 6 times per year from the beginning of 2006 to the beginning of 2007.
- The account earned 10.00% nominal interest per year compounded weekly from the beginning of 2007 to the beginning of 2010.
- The account earned 8.80% nominal interest per year compounded annually from the beginning of 2010 to the beginning of 2013.
- The account earned 6.20% nominal interest per year compounded daily from the beginning of 2013 to the beginning of 2014.

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

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$$25000(1 + 0.078/52)^{52*3}(1 + 0.11/6)^{6*1}(1 + 0.1/52)^{52*3}(1 + 0.088/1)^{1*3}(1 + 0.062/365)^{365*1}$$

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

Samantha just turned 34 years old and wants to start saving for retirement. She plans on retiring as soon as she turns 65 years old. She decides that she needs to save enough so that she can withdraw \$31,000.00 at the end of each year for 20 years, beginning at age 65. To save for retirement, needs to determine how much she needs to invest at the end of each year for the next 31 years. How much does Samantha need to invest each year for the next 31 years, assuming the deposits earn interest at 14.50% per year compounded annually? _____

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$$31000 * \frac{\frac{(1+0.145)^{20}-1}{0.145}}{1-\frac{(1+0.145)^{-31}}{0.145}}$$

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

Juan just turned 31 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 \$3,200.00 into an IRA (individual savings account) at the end of each year for the next 34 years. How much will Juan have saved for retirement, assuming the deposits earn interest at 13.00% per year compounded annually?

Suppose that Juan had already saved \$28,000.00 in their IRA by the time he turned 31. 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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$$3200 * \frac{(1 + 0.13)^{34} - 1}{0.13}$$

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$$28000 * (1 + 0.13)^{34} + 3200 * \frac{(1 + 0.13)^{34} - 1}{0.13}$$

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