

1. Time Value of Money Drill Problems

Find the present value of an ordinary annuity with cashflows of \$775.00 paid annually for 10 years at the interest rate of 1.40% per year, provided the interest is compounded annually. _____

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$$775 * \frac{1 - (1 + 0.014/1)^{-1*10}}{0.014/1}$$

2. Time Value of Money Drill Problems

Find the present value of \$4,500.00 due in 9 years at the interest rate of 8.70% per year, provided the interest is compounded annually. _____

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$$\frac{4500}{(1 + 0.087/1)^{9*1}}$$

3. Time Value of Money Drill Problems

Find the present value of \$9,500.00 due in 9 years at the interest rate of 10.40% per year, provided the interest is compounded annually. _____

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$$\frac{9500}{(1 + 0.104/1)^{9*1}}$$

4. Compound Interest, Accumulated Value

Find the accumulated amount if \$4,500.00 is invested at the interest rate of 10.90% per year for 4 years, provided the interest is compounded annually. _____

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$$4500 * (1 + 0.109/1)^{1*4}$$

5. Compound Interest, Present Value

Find the present value of \$5,000.00 due in 2 years at the interest rate of 0.70% per year, provided the interest is compounded annually. _____

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$$\frac{5000}{(1 + 0.007/1)^{1*2}}$$

6. Annuities, Accumulated Value

Find the accumulated amount of an ordinary annuity with cashflows of \$350.00 paid monthly for 4 years at the interest rate of 8.40% per year, provided the interest is compounded monthly. _____

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$$350 * \frac{(1 + 0.084/12)^{12*4} - 1}{0.084/12}$$

7. Annuities, Present Value

Find the present value of an ordinary annuity with cashflows of \$200.00 paid monthly for 4 years at the interest rate of 4.40% per year, provided the interest is compounded monthly. _____

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$$200 \frac{1 - (1 + 0.044/12)^{-12*4}}{0.044/12}$$

8. Loan Amortization

Find the periodic payment needed to amortize a loan of \$134,000.00 over 4 years if the payments are made semi-annually and the interest charged is 9.70% per year compounded semi-annually. _____

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$$\frac{134000}{\frac{1 - (1 + 0.097/2)^{-2*4}}{0.097/2}}$$

9. Time Value of Money Drill Problems

Find the present value of an ordinary annuity with cashflows of \$325.00 paid 6 times per year for 6 years at the interest rate of 4.70% per year, provided the interest is compounded 6 times per year. _____

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$$325 * \frac{1 - (1 + 0.047/6)^{-6*6}}{0.047/6}$$

10. Time Value of Money Word Problem Practice

Jon borrowed \$46,000.00 to finance their college education. Jon has to make payments at the end of each quarter over the next 17 years in order to pay off this debt. How much are the quarterly payments if interest accrues at 5.50% per year compounded quarterly? _____

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$$\frac{46000}{\frac{(1 + 0.055/4)^{4*17} - 1}{0.055/4}}$$

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 \$3,250.00 at the end of 2017.
- You plan on paying \$3,250.00 at the end of 2020.
- You plan on paying \$3,500.00 at the end of 2023.
- You plan on paying \$3,500.00 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 6.50% interest per year, compounded daily? _____

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$$\frac{3250}{(1 + 0.065/365)^{365*4}} + \frac{3250}{(1 + 0.065/365)^{365*7}} + \frac{3500}{(1 + 0.065/365)^{365*10}} + \frac{3500}{(1 + 0.065/365)^{365*13}}$$

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 2006 by depositing \$22,000.00.
- You deposit \$2,500.00 at the beginning of 2008.
- You withdrew \$3,500.00 at the beginning of 2010.
- You withdrew \$3,250.00 at the beginning of 2011.
- You deposit \$2,750.00 at the beginning of 2012.

Determine the accumulated value of the account at the beginning of 2014, assuming the account earns 6.20% interest per year, compounded weekly. _____

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$$22000(1 + 0.062/52)^{52*8} + 2500(1 + 0.062/52)^{52*6} - 3500(1 + 0.062/52)^{52*4} - 3250(1 + 0.062/52)^{52*3} + 2750(1 + 0.062/52)^{52*2}$$

13. Variable Interest Rate Problems

You invested \$13,000.00 in HRT stock at the beginning of 2011. In 2011, the value increased by 25.00%. In 2012, the value increased by 15.00%. In 2013, the value increased by 30.00%. In 2014, the value decreased by 25.00%. Determine the value of the stock at the end of 2014. _____

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$$13000(1 + 0.25)(1 + 0.15)(1 + 0.3)(1 - 0.25)$$

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 2006.

- The account earned 10.60% nominal interest per year compounded monthly from the beginning of 2006 to the beginning of 2009.
- The account earned 3.80% nominal interest per year compounded quarterly from the beginning of 2009 to the beginning of 2010.
- The account earned 1.40% nominal interest per year compounded quarterly from the beginning of 2010 to the beginning of 2011.
- The account earned 6.20% nominal interest per year compounded monthly from the beginning of 2011 to the beginning of 2013.
- The account earned 7.60% nominal interest per year compounded daily from the beginning of 2013 to the beginning of 2014.

The accumulated value of the account at the beginning of 2014 is \$19,000.00. Determine the initial amount that was invested.

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$$19000(1 + 0.106/12)^{-12*3}(1 + 0.038/4)^{-4*1}(1 + 0.014/4)^{-4*1}(1 + 0.062/12)^{-12*2}(1 + 0.076/365)^{-365*1}$$

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

You deposited \$20,000.00 in a bank account at the beginning of 2007.

- The account earned 4.40% nominal interest per year compounded annually from the beginning of 2007 to the beginning of 2009.
- The account earned 8.00% nominal interest per year compounded weekly from the beginning of 2009 to the beginning of 2011.
- The account earned 5.60% nominal interest per year compounded daily from the beginning of 2011 to the beginning of 2014.

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

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$$20000(1 + 0.044/1)^{1*2}(1 + 0.08/52)^{52*2}(1 + 0.056/365)^{365*3}$$

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

John just turned 30 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 \$27,000.00 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 35 years. How much does John need to invest each year for the next 35 years, assuming the deposits earn interest at 11.00% per year compounded annually?

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$$27000 * \frac{\frac{(1+0.11)^{20}-1}{0.11}}{1-\frac{(1+0.11)^{-35}}{0.11}}$$

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

Samantha just turned 36 years old and wants to start saving for retirement. She plans on retiring as soon as she turns 65 years old. She decides to invest \$3,900.00 into an IRA (individual savings account) at the end of each year for the next 29 years. How much will Samantha have saved for retirement, assuming the deposits earn interest at 11.50% per year compounded annually?

Suppose that Samantha had already saved \$25,000.00 in their IRA by the time she turned 36. 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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$$3900 * \frac{(1 + 0.115)^{29} - 1}{0.115}$$

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$$25000 * (1 + 0.115)^{29} + 3900 * \frac{(1 + 0.115)^{29} - 1}{0.115}$$

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