Financial Homework Problems  
Exploring Mathematics, Spring 2010

Complete your work on separate paper and turn it in. All answers should be rounded to the nearest cent. Assume that all interest rates given are annual unless explicitly stated otherwise.

F1. Kramer Bank offers three savings accounts. Account A offers 5.2% annual interest, compounded monthly. Account B offers 5.1% annual interest, compounded daily. Account C offers 5.0% annual interest, compounded continuously. Find the effective annual yield for each of the three accounts, and use those yields to determine which account offers the best return on deposits.

F2. Find the future value of each of the following ordinary annuities.

(a) Payments of $1200 made at the end of each year for 10 years, where 7% annual interest is compounded annually.

(b) Payments of $300 made at the end of each quarter for 10 years, where 8% annual interest is compounded quarterly.

(c) Payments of $51 made at the end of each month for 20 years, where 6% annual interest is compounded monthly.

(d) Payments of $100 made at the end of each week for 2 years, where 8% annual interest is compounded weekly. (Assume 52 weeks in a year.)

F3. How much total interest was earned in the annuity in problem F2b?

F4. Joe Parsimmons said he would set up an ordinary annuity for his newborn niece Gloria and deposit $100 each month, with the last payment to occur on her 18th birthday. The payments would earn 6% annual interest, compounded monthly. Joe’s wife Susan suggested they should just deposit a lump sum of money now into a bank account (earning 6% annual interest, compounded monthly), so that it would grow to the same amount as the annuity would be by Gloria’s 18th birthday. If they go with Susan’s plan, how much money must the loving aunt and uncle deposit in the account now?

F5. Zeke Fitzhugh decides to pay $300 at the end of each month into an ordinary annuity that pays 8% annual interest, compounded monthly, for five years. He decides to calculate the future value of this annuity at the end of five years, but he makes a mistake in his calculations. What was his mistake? Is his answer too big or too small?

\[
FV = PMT \cdot \left( \frac{(1 + i)^m - 1}{i} \right)
\]

\[
FV = 300 \cdot \left( \frac{(1 + .08)^{60} - 1}{.08} \right)
\]

\[
FV = 300 \cdot 1253.213296
\]

\[
FV = $375,963.99
\]
F6. Find the present value of each of the following ordinary annuities.

   (a) Payments of $500 made at the end of each quarter for 8 years, where 10% annual interest is compounded quarterly.

   (b) Payments of $100 made at the end of each month for 10 years, where 6% annual interest is compounded monthly.

F7. Suppose you win a “$1 million dollar” lottery prize. Hooray! You find out the lottery rules stipulate that you will be paid $50,000 today, and then $50,000 at the end of each year for the next 19 years, for a total of $1,000,000 paid out. Assuming that annual interest rates will stay at 5%, what is the present value of this prize? In other words, how much is this prize really worth today?

F8. Two oil wells are for sale. The well in Varmint, TX promises to yield payments of $6,000 at the end of each year for the next 10 years. The well in Mule’s Ear, TX will yield payments of $4,000 at the end of each year for the next 20 years. (Notice that the lengths of time are different!)

   (a) Assuming that annual interest rates will hold steady at 8% for the next 20 years, find the present value of each oil well. Which oil well has the higher present value?

   (b) Assuming that annual interest rates will hold steady at 6% for the next 20 years, find the present value of each oil well. Which oil well has the higher present value?

   (c) Why did the present values of the oil wells go up when the interest rates went down from part 8a to 8b?

F9. Suppose you borrow $16,000 from a bank to purchase a car. The bank charges 4% annual interest, compounded monthly. You are to make equal monthly payments at the end of each of the next 48 months to amortize your loan. How much are your monthly payments?
F10. The IRS has announced that the 2010 marginal income tax brackets will be:

<table>
<thead>
<tr>
<th>Tax Rate</th>
<th>Married Filing Jointly</th>
<th>Head of Household</th>
<th>Single</th>
<th>Married Filing Separately</th>
</tr>
</thead>
<tbody>
<tr>
<td>10%</td>
<td>Not over $16,750</td>
<td>Not over $11,950</td>
<td>Not over $8,375</td>
<td>Not over $8,375</td>
</tr>
<tr>
<td>15%</td>
<td>$16,750 - $68,000</td>
<td>$11,950 - $45,550</td>
<td>$8,375 - $34,000</td>
<td>$8,375 - $34,000</td>
</tr>
<tr>
<td>25%</td>
<td>$68,000 - $137,300</td>
<td>$45,550 - $117,650</td>
<td>$34,000 - $82,400</td>
<td>$34,000 - $68,650</td>
</tr>
<tr>
<td>28%</td>
<td>$137,300 - $209,250</td>
<td>$117,650 - $190,550</td>
<td>$82,400 - $171,850</td>
<td>$68,650 - $104,625</td>
</tr>
<tr>
<td>33%</td>
<td>$209,250 - $373,650</td>
<td>$190,550 - $373,650</td>
<td>$171,850 - $373,650</td>
<td>$104,625 - $186,825</td>
</tr>
<tr>
<td>35%</td>
<td>Over $373,650</td>
<td>Over $373,650</td>
<td>Over $373,650</td>
<td>Over $186,825</td>
</tr>
</tbody>
</table>

Exemption: $3,650

(a) Zeke wants to estimate how much he will have to pay on his 2010 tax return (which will be filed April 2011). Zeke is married with three young children, and his adjusted gross income is $53,000. Use the tables above to estimate as accurately as possible how much Zeke’s taxes will be, before any credits are applied.

(b) Money is tight these days, so Zeke’s wife Susanna is thinking about getting a job to bring in extra income. She can earn $20 per hour working in the hospital. The social security tax is 6.2% and the Medicare tax is 1.45% of her wages. They would have to pay $6/hour for child care while Susanna is at work. After social security, Medicare, income taxes, and child care, how much extra money is Susanna bringing in per hour?

F11. Thomas and Susan Ogilvie gave $3725 to charities in 2009, and they also donated $125 worth of used items to the St. Vincent de Paul thrift store. Susan is still recovering from a kidney transplant, and they had $4,521.39 in medical expenses. Thomas had $853.19 of unreimbursed expenses for his job as a building inspector. Their form 1098 reports that they paid $5,760.23 in home mortgage interest, and their property tax bill was $2012.00. On Form 1040, their Adjusted Gross Income on line 38 is $53,240. Fill out Schedule A for the Ogilvies.

(a) Should they itemize deductions or take the standard deduction?

(b) If they lie in the 15% marginal tax bracket, how much tax will that save them?

F12. For each of the following people, fill out a 2009 tax return. All relevant tax forms can be downloaded from the course website at [http://www.cord.edu/faculty/ahendric/105/taxforms/](http://www.cord.edu/faculty/ahendric/105/taxforms/). The 2009 Tax Tables are also found on that webpage; I recommend viewing the Tax Tables online rather than printing them out, so as to save paper.

You may assume that I have given you all relevant information; for example, Abednego’s “farm income (or loss)” (Form 1040, line 18) will be zero, since I did not tell you that Abednego had a farm. When an entry on the tax form should be zero because...
it’s irrelevant (like Abednego’s farm income), you may leave it blank instead. None of these examples qualify for the Earned Income Credit, but they all qualify for this year’s “Making Work Pay” credit. For the personal information at the top of the tax form (e.g. Social Security numbers and addresses) please make up the answers yourself. Be sure to reach the ultimate answer—either how much the person will get as a refund, or how much the person still owes. Sign your own name as the “Paid Preparer” at the bottom of form 1040 or 1040EZ.

(a) Shadrach Cohen is single; because his tax situation is utterly simple, he chooses to file form 1040EZ. His W-2 from work reports $38,127.28 in income and $3210.15 in federal withholdings. His bank’s 1099-INT reports $57.32 in taxable interest.

(b) Abednego and Hannah Leibowitz have one daughter, Jessica, who is 7 years old. They moved to Moose Lake this year; according to Form 3903, their eligible moving expenses are $873.12. The W-2’s report $68,721.14 from Abednego’s job at the steel mill, with $8,731.21 in withholdings, and $23,421.38 from Hanna’s part-time job at the junior high school, with $412.18 in withholdings. Moose Lake Credit Union has sent a 1099-INT showing $91.23 in taxable interest. Hannah is still paying off her student loans from college, and paid $1,210.13 in interest this year. They will take the standard deduction.

(c) Sven Olson is a single man working his way through college. His W-2 reads $18,243.12 in wages and $1291.50 in withholdings. Sven paid $8,892.00 in tuition and fees to St. Hallvard’s College this year. Sven will take the standard deduction. The emphasis here is on how Sven can use the tuition and fees to his best advantage. Compare the following options, and choose the best one:

i. The Tuition and Fees deduction

ii. The American Opportunity Credit

iii. The Hope Credit

iv. The Lifetime Learning Credit