Directions: This is a double quiz (meaning it counts as 2 quizzes). Please answer the following questions and make sure your answer are legible. If you don’t show work and/or I can’t follow it, I won’t give partial credit. You may use a calculator. Good Luck.

This quiz is take home, so it is open book/note. However, you may not discuss your answers with anyone except me (Dr. Jackie Kaminski). You are encouraged to start this early enough that you have time to email/visit office hours to ask me questions. You may still discuss HW questions with anyone on Earth. This quiz is due at 4:00pm on Wednesday (not whenever you walk into class on wednesday, not the next time you attend class, etc.). Late quizzes will receive a 3 point penalty, and no quizzes will be accepted after the end of class on Wednesday (march 30). You may turn in the quiz early under my office door (265 Hawthorn).

0. I certify that I have read the directions. And that I have not discussed my work on this quiz with anyone (other than Jackie Kaminski). This includes in-person communication, electronic communication and all other forms of communication. I understand that violating this policy is considered Academic Dishonesty, and will be dealt with accordingly (harshly).

signature

date

You’re going to plan your retirement! (Or a hypothetical person’s retirement)

• You may be realistic, optimistic, or pessimistic. You can think of this as a best case scenario, or us this to think about the minimum you need to save (or anything in between). It doesn’t even need to be yourself that you’re thinking of.

• You are not graded on the numbers you choose for Question 1 (as long as they are in the given range).

• You do NOT need to research numbers (but you are permitted to).

• If you (or a spouse) are working and know some of these numbers, feel free to lie to me or to use accurate numbers. (Don’t reveal any info about yourself that you don’t want to reveal).

• Things you should assume for this quiz:
  – All regular payments are monthly (rather than biweekly, etc.).
  – You’re employed full time (rather than being a student).
  – Your company offers a DC retirement plan with a traditional matching structure.
  – Assume your salary and retirement contributions will keep pace with inflation.
  – Assume you’re starting with 0 retirement savings at this point. (If you want to ask about how to take into account existing retirement savings, come talk to me, I’m happy to help).
1. (1 point) **Pick Relevant Numbers for your Retirement Planning.**

Choose numbers for each of the following to plan your retirement. There are required ranges given for the numbers to keep things somewhat realistic without you having to do research. The ranges also ensure calculations aren’t too easy/too hard.

You may think of these as numbers for one person, or as numbers for you + spouse.

<table>
<thead>
<tr>
<th>My Answer</th>
<th>Required Range</th>
</tr>
</thead>
<tbody>
<tr>
<td>a) $2500</td>
<td>Monthly income you need while retired (today’s dollars) $500 – $8000</td>
</tr>
<tr>
<td></td>
<td>This is money you need to come from your 401(k) type plan.</td>
</tr>
<tr>
<td></td>
<td>Social Security will (probably/maybe) provide you with some income.</td>
</tr>
<tr>
<td></td>
<td>Some money goes to taxes. You or you + spouse?</td>
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<tr>
<td></td>
<td>Are you still paying off a mortgage? renting? buying a condo in Florida?</td>
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<tr>
<td></td>
<td>Is Medicare sufficient insurance? Hobbies/Travel? etc. etc.</td>
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<tr>
<td>b) 45 years</td>
<td>Number of years until you retire 20-55 years</td>
</tr>
<tr>
<td>c) 25 years</td>
<td>Number of years you plan to be retired for 10-40 years</td>
</tr>
<tr>
<td></td>
<td>Sorry this is morbid.</td>
</tr>
<tr>
<td></td>
<td>Remember you will have $0 left after this many years.</td>
</tr>
<tr>
<td>d) 3%</td>
<td>Assumed US average inflation rate (next several decades) 2.75% – 3.75%</td>
</tr>
<tr>
<td></td>
<td>This is a longterm average</td>
</tr>
<tr>
<td>e) 8.25%</td>
<td>Assumed average CARG for your retirement account 4.5% – 12%</td>
</tr>
<tr>
<td></td>
<td>Also for the next several decades, also longterm average</td>
</tr>
<tr>
<td>f) $3000</td>
<td>Current monthly salary $1500 – $13000</td>
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<tr>
<td></td>
<td>Or combined monthly salary for you+spouse</td>
</tr>
<tr>
<td>g) 75%</td>
<td>Company matches retirement contributions at % 25% – 100%</td>
</tr>
<tr>
<td></td>
<td>Up to % of salary 2% – 8%</td>
</tr>
</tbody>
</table>

2. (1 point) If your retirement account is earning (1 e) percent interest and inflation is (1 d) percent, what is the **real rate of return** on your account? 

**Hint: this is an 8.3 question**

\[
\text{real rate of return} = \frac{8.25\% - 3\%}{8.25\%} = \frac{5.25\%}{8.25\%} = 62.4% 
\]
3. (4 points) We are assuming all calculations are in today's dollars:

How much money you need in your retirement account on the day you retire? You are trying to have enough money to make monthly payments of (1 a) dollars to yourself for (1 c) years. Use the real rate of return (2) as the interest rate on the account.

Hint, this is a Chap 4 question, choose the appropriate formula carefully. The only difference is we're using real rate of return as the interest rate of the account.

\[
PV = PMT \times a_{\overline{n}|i} \quad \text{(you have a big \$ \$ \$ on the day you retire... after that your bank act pays you till the balance is 0)}
\]

\[
PV = 2500 \\
PMT = 2500 \\
n = 25.12 \\
i = 0.0525/12 \\
a_{\overline{n}|i} = (you \ better \ know \ the \ formula) = 166.875897
\]

\[
PV = PMT \times a_{\overline{n}|i} = \$417,198.74
\]

4. (4 points) Assuming you will contribute to your retirement account by letting your monthly contributions keep pace with inflation, and that all dollar values are in today's dollars:

What monthly payments need to go into your retirement account so that you'll have (3) dollars (in today's dollars) in your retirement account in (1 b) years?  

Hint: this is an 8.3 question

\[
FV = PMT \times S_{\overline{n}|i} \\
FV = \$417,198.74 \\
PMT = ?
\]

\[
n = 45.12 \\
i = 0.0525/12 \\
S_{\overline{n}|i} = (you \ better \ know \ formula) = 2185.803767
\]

\[
PMT = \frac{FV}{S_{\overline{n}|i}} = \$190.86
\]

\[\text{Me + company need to put this into act each month}\]
5. (4 points) Assuming you make (1 f) as a monthly salary, and your company has the matching structure described in (1 g), 75% match up to 4.8%

How much do YOU need to contribute to your retirement account each month? Note, your contributions and the company’s contributions should combine to contribute (4) to the account each month.

Hint: this is an 8.2 question, don’t forget to check if you’re over your company’s Max matching.

\[ \text{multiplier} = 1.75 \]

\[ 1.75 \times \text{my cont} = \text{PMT} \]

\[ \text{my contrib} = 190.86 / 1.75 = 109.06 \]

(is this over max?)

Max: \, 4\% \, \text{of $3,000/month salary} \, = \, $120

So my contrib \, \$109.06

6. (1 point) What will the monthly contributions to your retirement account (5) be 5 years from now, assuming they keep pace with inflation (1 d)? You’re not answering in today’s dollars.

Hint: this is an 8.3 question

\[ FV = PV \times (1+i)^n \]

\[ i = .03 \]

\[ n = 5 \]

\[ PV = 109.06 \]

Congratulations, you just planned for your retirement. More importantly, you know how to plan for your retirement at points in the future when you have accurate information on some of the answers to Question 1. Note that in our calculations we assumed your salary just keeps pace with inflation, and you get no other raises/promotions (hopefully you do slightly better than this in real life).