1 Sections 3.1-3.4

1. Compute the amount we will have in 3 years if we earn simple interest on \$200 at 4%.
2. Compute the amount we will have in 3 years if we earn interest compounded annually on \$200 at 4% APR.
3. Compute the amount we will have in 3 years if we earn interest compounded monthly on \$200 at 4% APR. So it is compounded 12 times per year.
4. Compute the amount we will have in 3 years if we earn interest compounded monthly on \$200 at 4% APR. So it is compounded 12 times per year.
5. I want to retire! If I deposit \$1000 per month for the next twenty years at 7% (a conservative estimate for the total stock market index) interest compunded annually, how much will I have when I retire.
6. After I retire, I expect to live off the amount above (Problem 5). For this problem assume I want twenty years of annual payments with 5% interest. How much can I expect as a payment each year for the twenty years?
7. After I retire, I expect to live off the amount above (Problem 5). For this problem assume I want forty years of annual payments with 5% interest. How much can I expect as a payment each year for the forty years?
8. After I retire, I expect to live off the amount above (Problem 5). For this problem assume I want forty years of annual payments with 5% interest. How much can I expect as a payment each year for the sixty years? What do you notice about the last few problems?

2 Sections 4.1-4.6

9. Write the following system of linear equations as an augmented matrix.

$$\begin{cases} 2x & -2y & & = 8 \\ & y & +z & = 2 \\ 3x & +2y & -z & = 16 \end{cases}$$

10. for the augmented matrix from Problem 9, perform the following row opertions

- Step 1.

$$\begin{bmatrix} \frac{1}{2}R_1 & \to R_1 \\ R_2 & \to R_2 \\ R_3 & \to R_3 \end{bmatrix}$$

- Step 2.
$$\begin{bmatrix} R_1 & \to R_1 \\ R_2 & \to R_2 \\ R_3 - 3R_1 & \to R_3 \end{bmatrix}$$
- Step 3.
$$\begin{bmatrix} R_1 + R_2 & \to R_1 \\ R_2 & \to R_2 \\ R_3 - 5R_2 & \to R_3 \end{bmatrix}$$
- Step 4.
$$\begin{bmatrix} R_1 & \to R_1 \\ R_2 & \to R_2 \\ -\frac{1}{6}R_3 & \to R_3 \end{bmatrix}$$
- Step 5.
$$\begin{bmatrix} R_1 - R_3 & \to R_1 \\ R_2 - R_3 & \to R_2 \\ R_3 & \to R_3 \end{bmatrix}$$

11. Write the solution down from the above row reduction.

12. Write as an augmented matrix. Row reduce (to RREF). Interpret your result.
$$\begin{cases} x & +y & +z & = 0 \\ 3x & & -z & = 7 \\ x & +2y & & = 7 \end{cases}$$

13. Write as an augmented matrix. Row reduce (to RREF). Interpret your result.
$$\begin{cases} x & +2y & -z & = 2 \\ x & & +z & = 0 \\ & y & -z & = 1 \end{cases}$$

14. Write as an augemeted matrix, and solve via row reduction (put into RREF).
$$\begin{cases} x & +y & = 0 \\ 3x & & = 9 \end{cases}$$

15. Write as an augemeted matrix, and solve via row reduction (put into RREF).
$$\begin{cases} x & +y & +z & = 0 \\ 3x & & -z & = 7 \\ x & +2y & & = 7 \end{cases}$$

16. Let
$$A = \begin{bmatrix} 1 & 0 & 3 \\ -1 & 2 & 3 \end{bmatrix}, B = \begin{bmatrix} 1 & 2 \\ 0 & 2 \\ 1 & -1 \end{bmatrix}, \text{ and } C = \begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}.$$
compute the following.

(a) AB

(b) BA

(c) $3C - BA$

(d) C^2

(e) C^{-1}

(f) $(I - C)^{-1}$

17. Write the linear system below as a matrix multiplication problem as $A\mathbf{X} = \mathbf{b}$.

$$\begin{cases} x & +y & = 0 \\ 3x & +y = 7 \end{cases}$$

18. For the matrix A in Problem 17. ind A and compute $A^{-1}\mathbf{b}$. What is the solution to Problem 17?

3 Section 4.7 Leontief Input output matrices

$$X = (I - M)^{-1}D$$

19. An economy is based on two industrial sectors, coal and steel. Production of a dollar worth of coal requires an input of \$0.10 from the coal sector and \$0.20 from the steel sector. Production of a dollar worth of steel requires an input of \$0.20 from the coal sector and \$0.40 from the steel sector. Find the output for each sector that is needed to satisfy a final demand of \$20 billion for coal and \$10 billion for steel.

20. An economy is based on two sectors, coal and steel. Given the technology matrix M and the final demand matrix D (in billions of dollars), find $(I - M)^{-1}$ and the output matrix X:

$$M = \begin{bmatrix} 0.45 & 0.65 \\ 0.55 & 0.35 \end{bmatrix} D = \begin{bmatrix} 40 \\ 10 \end{bmatrix}$$

4 Section 5.1 Linear Inequalities

21. Graph the feasible region for the following linear inequalities

(a) $y \leq 3x + 1$, $x \geq 0$ and $y \geq 0$

(b) $x + 3y \geq 9$, $x \geq 0$ and $y \geq 0$

(c) $y \leq 3x + 1$, $x \geq 0$ and $y \geq 0$

22. Enrollment in finite mathematics plus enrollment in calculus is less than 300.

23. Seed costs for a farmer are \$40 per acre for corn and \$32 per acre for soybeans. How many acres of each crop should the farmer plant if he wants to spend no more than \$5,000 on seed?

24. Labor costs for a farmer are \$55 per acre for corn and \$45 per acre for soybeans. How many acres of each crop should the farmer plant if he wants to spend no more than \$6,900 on labor?

- Simple Interest

  $A = P(1 + rt)$

- Compuond interest

  $A = P(1 + \frac{r}{m})^{mt}$, and $A = P(1 + i)^n$

- Continuosly compunded

  $A = Pe^{rt}$

- Future Value

  $FV = PMT\frac{(1 + i)^n - 1}{i}$

- Present Value

  $PV = PMT\frac{1 - (1 + i)^{-n}}{i}$

- Leontief Input output matrices

  $X = (I - M)^{-1}D$