1   Week 14 HOGU: 6.1, Final Exam Review Part 1

Problem 1. Consider the following scenario:

> You want to have $30,000 in your retirement fund. You currently have $10,000 to invest for retirement in an account that earns 2.4% interest, compounded quarterly.

How long would it take for you, in years, to end up with $30,000 in your account?

Problem 2. You are purchasing new furniture from a local retailer. The furniture price is $12,500, and the retailer offers financing options A and B. After 10 years, if you have not paid anything on the loan, how much interest have you accrued using each loan option?

   (a) 9.7% APR, compounded monthly

   (b) 9.67% APR, compounded daily

When you are done, answer these questions: which one is the better financing option? What is the APY for each financing option?

Problem 3. Let $A = \begin{bmatrix} 4 & 2 \\ a & b-c \end{bmatrix}$, $B = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}$, and $C = \begin{bmatrix} -3 & 5 \\ 4 & -8 \\ 0 & 1 \end{bmatrix}$. Only one of the matrix products $AC^T B$ and ACB^T exists. Circle which of the two products exists below.

$$AC^T B \qquad ACB^T$$

Then calculate below the matrix product you circled.

Problem 4. At Texas A& M, each Math 140 has to pay $21 for a WebAssign subscription and $81 for a TI-84 calculator.

Each Math 151 student has to pay $125 for a WebAssign subscription and $81 for a TI-84 calculator.

Each Math 251 student has to pay $100 for WebAssign and $0 for a TI-84 calculator. (They do not need one since they already have it from a previous class.)

(a) Set up the information above in a 2×3 matrix A, labeling each row and column with the information given. Use the column labels: "140" for Math-140 students, "151" for Math-151 students, "251" for Math-251 students, "WA" for WebAssign subscriptions, and "TI" for TI-84 calculators.

(b) In the fall semester, 4100 students enroll in Math 140, 3200 students enroll in Math 151, and 1500 students enroll in Math 251. Set this information up as a 3×1 matrix B, labeling each row and column with the information given.

(c) Calculate AB. What is the meaning of each entry in the product matrix AB?

Problem 5. Write the equations for each of the lines A, B, C, and D in slope-intercept form. Use fractions, not decimals, in your answers.

A:

B:

C:

D:
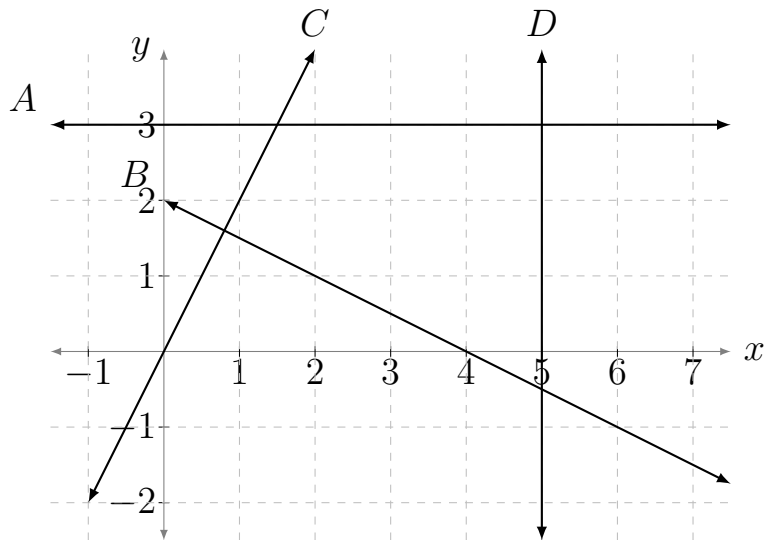
Problem 7. Use the RREF function in your calculator to calculate *all* solutions to the system of linear equations.

$$\begin{cases} 4x & - & y & + & z & = & 5 \\ & & 2y & + & 6z & = & 30 \\ & & x & + & z & = & 5 \end{cases}$$

Problem 8. The corner points of a bounded feasible region in quadrant I are $(8,0)$, $(0,10)$, $(6,2)$, and $(3,4)$. What are the maximum and minimum values of $P = 4x + y$ on this feasible region?

Problem 9. Is the given simplex tableau in final form? If it is in final form, state the answer. If not, identify the pivot element.

x	y	z	s_1	s_2	s_3	P	constant
1	2	0	1	0	0	0	28
2	0	4	0	1	0	0	16
0	-1	1	0	0	1	0	0
-2	-5	-3	0	0	0	1	0

Problem 10.   (a) *Set up but do not solve* the following linear programming problem:

The Texas A&M Rec Center has a rock climbing pass that sells for $50 a month and a general gym pass that sells for $80 a month. The rec center calculates that every climbing pass sold requires 1 expert employee and 3 novice employees to be on duty, and that every general gym pass requires 2 expert employees and 4 novice employees to be on duty. They also want to sell at least twice as many general gym passes as climbing passes. If there are 32 expert employees and 84 novice employees ready to be put on duty, how many of each type of pass should the Rec Center be selling to maximize their revenue?

Variables:

Objective: Maximize/minimize (circle one) _____

Subject to:

(b) Write this system of equations in a simplex tableau. What is the first pivot element?