



EXAM 2 REVIEW OVER CHAPTERS 3 AND 4

1. A local taco truck has \$8000 available each month for advertising. Ads in the university newspaper will cost \$400 each, while radio ads costs \$20 each, and internet banners on the university library page cost 50 cents each. The taco truck wants to run at least twice as many radio ads as newspaper ads. Approximately 4000 students will see each newspaper ad, 3000 students will hear each radio ad, and 700 students will see each internet banner. How many of each type of ad should the taco truck run to maximize the number of students who see or hear the ads. **Set up, but do not solve.**

Variables:

_____ := _____

_____ := _____

_____ := _____

_____ := _____

Objective: Maximize/ Minimize _____

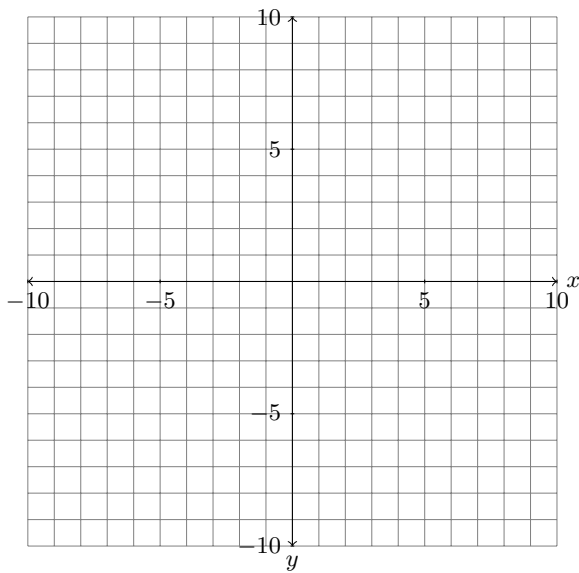
Subject to: _____

2. Graph the system of inequalities below. Then determine if the solution set is bounded or unbounded.

$$3x + 2y \geq 18$$

$$3x - 4y < 24$$

$$x \geq 0, y \geq 0$$



3. A small company manufactures two types of electronic readers: ReadOnly and ReadPlus. Each electronic reader goes through three production lines during assembly, fabrication of shell, inserting the motherboard, and applying the screen. Each ReadOnly requires 2 hours of fabrication, 4 hours to insert the motherboard, and 2 hours to apply the screen. Each ReadPlus requires 4 hours of fabrication, 2 hours to insert the motherboard, and 2 hours to apply the screen. The total time available per week for fabrication is 4800 minutes, while time for inserting the motherboard and applying the screen are 5040 minutes and 3000 minutes respectively. Both readers produce a \$70 profit for the company. How many of each type of reader should be made to maximize the company's profit? Solve the linear programming problem using the method of corners.

Variables:

x := the number of ReadOnly electronic readers made and sold

y := the number of ReadPlus electronic readers made and sold

P := the company's profits, in dollars, from the sales of these two electronic readers

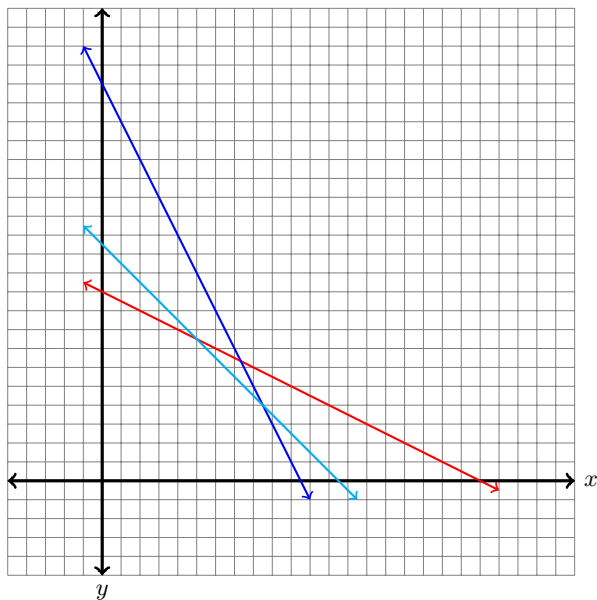
Objective: Maximize/ Minimize _____

Subject to: _____ (total time spent in fabrication)

_____ (total time spent inserting the motherboard)

_____ (total time spent applying the screen)

$$x \geq 0, y \geq 0$$



4. A 4-H member raises only goats and pigs. She has pen space for no more than 16 animals. She spends \$25 to raise each goat and \$75 to raise each pig and she has \$900 available for this project. Each goat produces \$12 in profit and each pig \$40 in profit. Using linear programming techniques, we find 12 pigs and no goats should be raised to maximize the 4-H member's profit. Are there any leftover resources, and if so what are they?

5. Write the corresponding initial simplex tableau for the linear programming problem.

$$\text{Maximize: } P = 36x + 15y + 27z$$

$$\text{Subject to: } 100x + 250y - 480z \leq 8000$$

$$80x - 975y + 3400 \geq 300z$$

$$750y + 124x \leq 324z$$

$$x \geq 0, y \geq 0, z \geq 0$$

6. State the pivot column, pivot row, and pivot element for the given simplex tableau below. Then indicate the corner point of the feasible region corresponding to the given tableau.

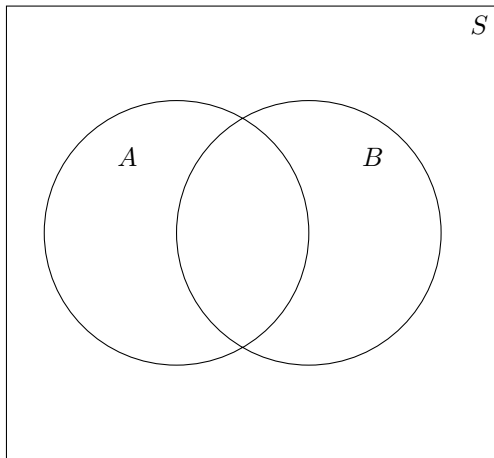
x	y	z	s_1	s_2	s_3	P	constant
1	0	0	$\frac{2}{5}$	0	$-\frac{5}{2}$	0	22
0	6	0	-4	1	2	0	0
0	$\frac{3}{4}$	1	5	0	0	0	12
0	-9	0	-7	0	-4	1	340

7. For the final tableau below, read the solution. Then, if the linear programming problem represented a real-world scenario, would there be any leftovers?

x	y	z	s_1	s_2	s_3	P	constant
3	0	1	$\frac{2}{5}$	-4	0	0	459
$\frac{4}{5}$	1	0	3	1	0	0	723
1	0	0	7	6	1	0	148
8	0	0	$\frac{1}{2}$	0	0	1	278

8. In an experiment, a fair standard 20-sided die is rolled, noting whether or not the number facing is a multiple of 5, and then a card is drawn from a well-shuffled deck, noting the suit. Write the sample space for the experiment.

9. Shade $(A^C \cap B)^C \cup B$ on the Venn Diagram. Your answer must be obvious to the instructor.



10. Assuming two fair standard six-sided dice are rolled, one green and one blue, and let

A = the event “a sum of 8 is rolled”,

B = the event “a 4 is showing on the blue die”, and

D = the event “an number less than 3 shows on the green die”.

(a) Write the symbolic equivalent of the event “a sum of 8 is rolled, but the blue die isn’t showing a 4 and the green die is showing a number less than 3”.

(b) Verbally describe $D^C \cup A^C$

11. A survey of 50 veterans from the Air Force and Navy was taken to gather information on their service career and what life is like outside of the military. A breakdown of those surveyed is shown in the table. Suppose a randomly selected veteran from the Air Force or Navy is interviewed. What is the probability the person chosen is

	Air Force	Navy	Total
Private	6	9	15
Corporal	10	8	18
Sergeant	4	5	9
Lieutenant	2	1	3
Captain	2	3	5
Total	24	26	50

(a) P(is a Corporal or in the Navy)

(b) P(in the Air Force or in the Navy)

(c) P(is a Private and a Lieutenant)

(d) P(is not in the Air Force, but is a Sergeant)

(e) P(is not a Captain and was in the service)

12. Given $P(A) = 0.4$, $P(B) = 0.7$, and $P(A \cup B) = 0.8$, compute $P[(A \cap B)^C]$.

13. Your insurance company has a policy to insure personal property. Assume your personal property is worth \$2,200, and according to campus statistics there is a 2% chance that your property will be stolen during the next year and a 15% chance that your property is damaged beyond repair through natural causes during the next year. If your property is stolen the policy will give you \$2,200, while if it is damaged beyond repair you receive get \$1,100. What should the insurance company charge as a premium for this policy, if they would like an expected profit of \$100?