

(10pts) NAME (printed neatly): _____

(4pts) Section Number (circle correct section): 521(9:10am) 522 (10:20am) 514 (11:30am) 525(1:50pm)

Quiz Grade: _____

A clown makes two types of balloon animals: mammals and dinosaurs. A mammal balloon take 25 units of helium and 7 minutes to make, while a dinosaur take 16 units of helium and 16 minutes to make. Each month the clown has 5600 labor minutes and 12800 units of helium available to make balloon animals. If a mammal balloon sells for \$2 each and a dinosaur sells for \$5 each, how many of each type should the clown make to maximize revenue if at least 160 balloon mammals are needed?

a. (6pts) Define your variables x and y , where x is related to mammals.

x = number of mammal balloons

y = number of dinosaur balloons

b. (18pts) Set up the linear programming problem.

Maximize $R = 2x + 5y$

Subject to

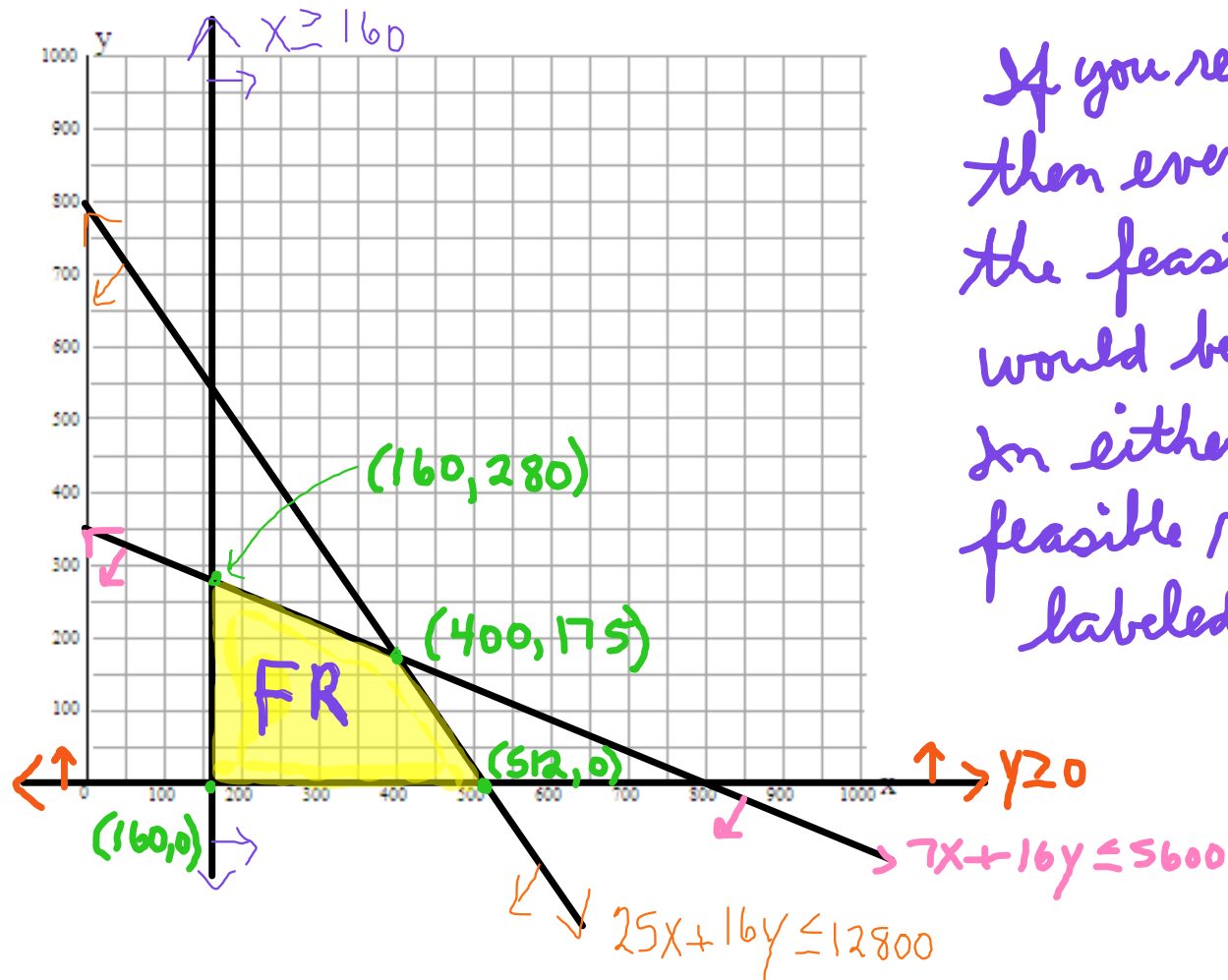
$25x + 16y \leq 12800$ (units helium)

$7x + 16y \leq 5600$ (minutes labor)

$x \geq 160$ ($x \geq 0$ is unnecessary, though correct)

$y \geq 0$

c. (20pts) Graph the constraints, label the lines, label the corner points, and label the feasible region *FR*.



If you reverse shade, then everything but the feasible region would be shaded. In either case the feasible region is labeled *FR*.

d. (20pts) Show your work to solve this linear programming problem.

<u>Comer</u>	<u>$R = 2x + 5y$</u>
(160, 0)	320
(160, 280)	1720
(400, 175)	1675
(512, 0)	1024

e. (16pts) Write a sentence that gives the solution to this linear programming problem by including all critical information.

The maximum revenue of \$1720 is obtained when 160 mammal balloons and 280 dinosaur balloons are made and sold.

f. (6pts) Discuss leftovers.

$$25x + 16y \leq 12800 \quad (\text{units helium})$$

$$25(160) + 16(280) \leq 12800$$

$$8480 \leq 12800$$

$$12800 - 8480 = 4320$$

Therefore there are 4320 units of helium leftover.

$$7x + 16y \leq 5600 \quad (\text{minutes labor})$$

$$7(160) + 16(280) \leq 5600$$

$$5600 \leq 5600$$

Therefore there are no labor minutes leftover.