

Name \_\_\_\_\_

SHOW AS MUCH WORK AS POSSIBLE BECAUSE YOU MAY RECEIVE PARTIAL CREDIT FOR THE WORK YOU DO IF YOUR ANSWER IS INCORRECT.

1. A biotech company is planning an IPO (initial public offering) and plans to sell \$10 million in stock. The stock will only be sold in amounts of \$20000, \$30000, and \$50000. This initial sale will be limited to 400 investors.

Let  $x_1$  be the number of \$20000 investors,  $x_2$  be the number of \$30000 investors, and  $x_3$  be the number of \$50000 investors.

- a. Express this scenario as a system of linear equations, BUT DO NOT SOLVE IT.

$$\begin{cases} x_1 + x_2 + x_3 = 400 \\ 20000x_1 + 30000x_2 + 50000x_3 = 10000000 \end{cases}$$

- b. Write the augmented matrix that corresponds to the system.

$$\left( \begin{array}{ccc|c} 1 & 1 & 1 & 400 \\ 20000 & 30000 & 50000 & 10000000 \end{array} \right)$$

2. When the augmented matrix for the previous scenario is row-reduced, the result is:

$$\left( \begin{array}{ccc|c} 1 & 0 & -2 & 200 \\ 0 & 1 & 3 & 200 \end{array} \right)$$

- a. Write the solution set in parameterized form.

$$\begin{cases} x_1 = 200 + 2t \\ x_2 = 200 - 3t \\ x_3 = t \end{cases}$$

- b. Assuming all \$10 million in stock is sold to a total of 400 investors, find the minimum and maximum number possible for each type of investor. (NOTE: The number of investors has to be a whole number.)

$t$	$x_1$	$x_2$	$x_3$
0	200	200	0
66	332	2	66
67	334	-1	67

At least 200 but no more than 332 \$20000 investors.  
 At least 2 but no more than 200 \$30000 investors.  
 No more than 66 \$50000 investors.