#1 x invested at 6%
y invested at 8%

$$x+y=2000$$
$$.06x+.08y=144$$

#2a
$$x=3$$
$$y+z=-1$$
$$u=2$$

#2b infinitely many solutions

*3. For the following system of linear equations, set up the augmented matrix and use Gauss-Jordan reduction to solve the system.

$$\begin{aligned} -x \quad +2y \quad -z &= 0 \\ -x \quad -y \quad +2z &= 0 \\ 2x \qquad\quad -z &= 6 \end{aligned}$$

$$\left[\begin{array}{ccc|c} -1 & 2 & -1 & 0 \\ -1 & -1 & 2 & 0 \\ 2 & 0 & -1 & 6 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} -1 & 2 & -1 & 0 \\ 0 & -3 & 3 & 0 \\ 0 & 4 & -3 & 6 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} -1 & 2 & -1 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 4 & -3 & 6 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} -1 & 0 & 1 & 0 \\ 0 & 1 & -1 & 0 \\ 0 & 0 & 1 & 6 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} -1 & 0 & 0 & -6 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 6 \end{array}\right]$$

$$\left[\begin{array}{ccc|c} 1 & 0 & 0 & 6 \\ 0 & 1 & 0 & 6 \\ 0 & 0 & 1 & 6 \end{array}\right]$$

$x = 6$
$y = 6$
$z = 6$

4. Write the initial tableau for the following linear programming problem. You need not solve the problem.

Maximize $p = 20x + 30y$.

subject to the following constraints.

$$\begin{array}{llll} 2x & +10y & \leq & 80 \\ 6x & +2y & \leq & 72 \\ 3x & +2y & \geq & 6 \\ x & & \geq & 0 \\ & y & \geq & 0 \end{array}$$

$$\begin{array}{l} 2x + 10y + s = 80 \\ 6x + 2y + t = 72 \\ 3x + 2y - u = 6 \\ -20x - 30y + p = 0 \end{array}$$

2	10	1	0	0	0	80
6	2	0	1	0	0	72
3	2	0	0	-1	0	6
-20	-30	0	0	0	1	0

5. The following is an initial tableau. Determine the pivot.

		x	y	z	s	t	u	p		
9/1	s	3	1	2	1	0	0	0	9	9/3 ←
8/1	t	2	3	1	0	1	0	0	8	8/2
7/1	u	1	2	3	0	0	1	0	7	7/1
		−20	−12	−18	0	0	0	1	0	

6. The following is an initial tableau. Determine the pivot.

or

		x	y	s	t	u	p	
8/1	s	1	1	1	0	0	0	8
21/1	t	5	3	0	-1	0	0	21
9/1	u	1	3	0	0	-1	0	9
		-8	-5	0	0	0	1	0

7. The following is a final tableau. Determine the maximum value of p and the values of x, y, and z.

	x	y	z	s	t	u	p	
z	0	1	2	3	−1	0	0	90
x	6	3	0	−3	3	0	0	30
u	0	0	0	−9	−1	1	0	490
	0	0	0	12	0	0	3	600

$p = 600/3$

$x = 30/6$

$y = 0$

$z = 90/2$

#8a Maximize $p = 9x + 5y$

subject to $400x + 200y \le 2000$

$12x + 8.5y \le 65$

$x \ge 0$

$y \ge 0$

#8b

$$\begin{matrix} 400 & 200 & 1 & 0 & 0 & 2000 \\ 12 & 8.5 & 0 & 1 & 0 & 65 \\ -9 & -5 & 0 & 0 & 1 & 0 \end{matrix}$$

#8c

#9c

#9

$$\begin{matrix} 0 & 0 & 2 & 3 & 1 & 0 & 20 \\ 0 & 1 & 0 & -1 & 0 & 0 & 10 \\ 2 & 0 & 0 & -1 & -1 & 0 & 10 \\ 0 & 0 & 0 & -5 & -1 & 2 & 50 \end{matrix}$$

#9a $p = 50/2$ $x = 10/2$ $y = 10/1$ $s = 20/2$ $t = 0$ $u = 0$

#9b phase II

#10

$$\begin{bmatrix} 1 & -1 & 0 \\ 1 & 1 & 2 \\ 1 & 2 & 1 \end{bmatrix} \begin{bmatrix} x \\ y \\ z \end{bmatrix} = \begin{bmatrix} 1 \\ 2 \\ 0 \end{bmatrix}$$

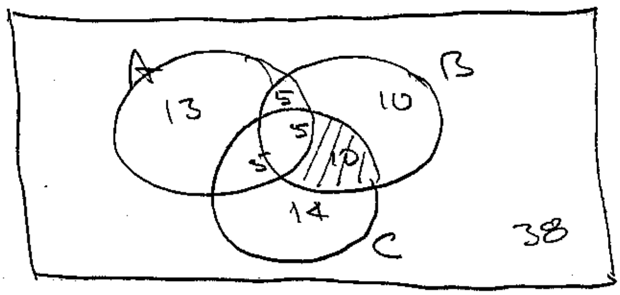
11. Find the inverse of $\begin{bmatrix} 2 & 1 & -1 \\ 1 & 1 & -1 \\ -1 & -2 & 3 \end{bmatrix}$.

$$\begin{bmatrix} 2 & 1 & -1 & 1 & 0 & 0 \\ 1 & 1 & -1 & 0 & 1 & 0 \\ -1 & -2 & 3 & 0 & 0 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 1 & -1 & 0 & 1 & 0 \\ 2 & 1 & -1 & 1 & 0 & 0 \\ -1 & -2 & 3 & 0 & 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 1 & -1 & 0 & 1 & 0 \\ 0 & -1 & 1 & 1 & -2 & 0 \\ 0 & -1 & 2 & 0 & 1 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 & 0 & 1 & -1 & 0 \\ 0 & -1 & 1 & 1 & -2 & 0 \\ 0 & 0 & 1 & -1 & 3 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 & 0 & 1 & -1 & 0 \\ 0 & -1 & 0 & 2 & -5 & -1 \\ 0 & 0 & 1 & -1 & 3 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 & 0 & 0 & 1 & -1 & 0 \\ 0 & 1 & 0 & -2 & 5 & 1 \\ 0 & 0 & 1 & -1 & 3 & 1 \end{bmatrix}$$

#12



10

#13 $26 * 9 * 10^4 = 2,340,000$

#14 $P(26,6) = 26*25*24*23*22*21$
$= 165765600$

#15 2 men 3 women
$C(10,2)\,C(10,3) = 5400$

#16 $C(7,2)\,C(5,2)\,C(9,2)$

#17 $P(C \cup B) = P(C) + P(B) - P(C \cap B)$

$= 70/100 + 30/100 - 10/100$

$= 90/100$

#18a $P(go \mid gu) = 5/12$

#18b $P(s' \mid go) = 7/16$

#19

$P(\text{male}) = 19/31$

$P(\text{math}) = 10/31$

$P(\text{both}) = 6/31$

$P(\text{male})\,P(\text{math}) \stackrel{?}{=} P(\text{both})$

$19/31 \cdot 10/31 \stackrel{?}{=} 6/31$

not independent

#20 $P(h) = 0.6$ $P(a) = 0.4$ $P(wm \mid h) = 0.8$

$P(wm \mid a) = 0.55$

$$P(h \mid wm) = \frac{P(wm \mid h)\,P(h)}{P(wm \mid h)\,P(h) + P(wm \mid a)\,P(a)}$$

$$= \frac{0.8 * 0.6}{0.8 * 0.6 + 0.55 * 0.4} \approx 0.68$$