HOMEWORK 2

DUE WEDNESDAY, JANUARY 21ST

FROM JACOB:

Section 3.1 — #8
Section 3.2 — #2 b,c; #4; #5; #6 a,c
Section 3.3 — #3; #7; #13 a,c; #17

NOT FROM JACOB:

1. Scientists have reconvened and found the true equations relating the following quantities. As before, you should interpret I as intelligence, A as attractiveness, C as the number of cups of coffee you have had, and B as the number of beers.

$$\begin{pmatrix} I \\ A \end{pmatrix} = \begin{pmatrix} 2 & -3 \\ -1 & -3 \end{pmatrix} \begin{pmatrix} C \\ B \end{pmatrix}.$$

They also found the following equation that gives your likeliness L to get a date:

$$(L) = \begin{pmatrix} 1 & 5 \end{pmatrix} \begin{pmatrix} I \\ A \end{pmatrix}.$$

What is the significance of the 1,2-entry of the product

$$P = \begin{pmatrix} 1 & 5 \end{pmatrix} \begin{pmatrix} 2 & -3 \\ -1 & -3 \end{pmatrix}?$$

Explain why the product of these matrices in the opposite order does not make sense. Finally, what is the significance of the following products:

- $P \begin{pmatrix} x \\ y \end{pmatrix}$
- $\begin{pmatrix} 2 & -3 \\ -1 & -3 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix}$

2. Consider the equation $x + y + z = 1$. Sketch for $z = 0, 1, 2$ the solution sets for the corresponding equations in two variables (as subsets of the plane). Explain how one can view these solution sets as cross-sections of the plane $x + y + z = 1$ in $\mathbb{R}^3$, and explain how one can visualize this plane as a movie about lines floating around in $\mathbb{R}^2$. Consider now the three-dimensional subset of $\mathbb{R}^4$ described by the equation $x + y + z + t = 1$. Try to draw cross-sections of this set for $t = 0, 1, 2$, and illustrate how to visualize this set with a movie about planes moving around in three-dimensional space.