http://math.berkeley.edu/~kmill
Tentative office hours:
T: 1-2 pm
Th: 4-5 pm
} 1066 Evans

Discussion — Aug 29

1. For each of the following solution set shapes, how many free variables would a system have?
   a) a point b) a line c) a plane
2. Row reduce to identify pivot positions. Give a solution to the system in terms of the free variables
   a) $\begin{cases} x_1 + 2x_2 = 3 \\ 2x_1 + 4x_2 = 6 \end{cases}$ b) $\begin{cases} x_1 + 2x_2 = 3 \\ 2x_2 + 5x_2 = 7 \end{cases}$
   c) $\begin{cases} x_1 + 2x_2 + 3x_3 = 0 \\ 4x_1 + 5x_2 + 6x_3 = 0 \\ 7x_1 + 8x_2 + 9x_3 = 0 \end{cases}$ d) $\begin{cases} x_1 = 2 \\ x_2 + x_3 = 1 \end{cases}$
3. Row reduction is a way to find some minimal subset of variables all solutions are functions of. Variable order matters.
   a) sketch $3x_1 + x_2 = 3$
   b) Row reduce with x_1, x_2 order and solve
   c) Row reduce with x_2, x_1 order and solve
   d) What is going on graphically? (Hint: x_1 and x_2 are functions of each other.)
4. Do the same with $x_1 + 0x_2 = 1$.
5. Come up with a 3×4 augmented matrix for each situation:
   a) inconsistent system
   b) consistent with the unique solution $(2,3,4)$
   c) consistent with one free variable
   d) consistent with two free variables.
6. Find a quadratic polynomial $p(x)$ satisfying $p(1) = 1$, $p(2) = 3$, and $p(3) = 6$.
7. λ (the Greek letter λ) is a constant. For which values of λ does the following system have more than one solution? $\begin{cases} (\lambda - 3)x + y = 0 \\ x + (\lambda - 3)y = 0 \end{cases}$.