

## Homework #2

due Tuesday, September 10

### Exercises from Strang:

Problem Set 2.4 #1,2,5,6,26

Problem Set 2.7 #4

Problem Set 2.1 #9,10,15–20,33

Problem Set 2.2 #1,2,4,5,7,13,17

### Additional Problems:

1. Three planes can fail to have an intersection point, even if no planes are parallel. Consider the two planes  $A : x + y + z = 0$  and  $B : x - 2y - z = 1$ . Use the tool here <https://technology.cpm.org/general/3dgraph/> to visualize these two planes, then answer the following questions:
  - (1) What is the shape of the intersection  $A \cap B$  of the two?
  - (2) Use the equations of  $A$  and  $B$  to construct a third plane  $C$  whose intersection with the two is exactly the same as  $A \cap B$ . That is,  $A \cap B \cap C = A \cap B$  (Hint: how can you create a singular system of three equations?)
  - (3) Find a fourth plane  $D$  such that  $A \cap D$ , and  $B \cap D$  are both non-empty, but  $A \cap B \cap D$  is empty. That is,  $D$  should intersect both  $A$  and  $B$ , but the three should never meet. (Hint: Construct a permanent breakdown!)

For both the last two parts, I strongly suggest you use the tool linked above to draw the planes and see your answers!