

MATH 20C
WINTER 2020
SECTION D00 (MANNERS)

HOMEWORK – WEEK 3

Due by 2359 (11:59 PM) on Sunday January 26. Hand in via Gradescope.

For problem 0, credit is awarded for any honest response, not for the amount of work undertaken.

For problems 1, 2 and 3, you *must* give a fully written-out solution showing all your working and justification. Stating the correct answer, by itself, will earn no credit.

0. Do the following textbook problems. *Do not turn them in*, but provide a list here of those for which you wrote down solutions.

§1.3: 3, 5, 11, 15, 21, 31

§2.1: 3, 7, 13, 25

(1 points)

1. The lines

$$\{(3 + t, 2 - t, 1 - 2t) : t \in \mathbb{R}\},$$

$$\{(5 + t, 7 - t, 9 - 2t) : t \in \mathbb{R}\}$$

are parallel. Find the equation of the plane that contains both of them, in the form $ax + by + cz = d$.

(6 points)

2. Consider the planes

$$x + y + z = 1,$$

$$2x - y + z = 1.$$

- (a) Write down the perpendicular directions to these two planes.
(b) Show that $(0, 0, 1)$ lies on both planes.
(c) Find a parametric equation for the line where these two planes intersect.

(6 points)

3. Consider function $f(x, y) = x^2 + y^2 - 2xy$ and the 3D graph $z = x^2 + y^2 - 2xy$.

- (a) Sketch the level sets $f(x, y) = c$ for $c = 0, 1, 2, 3$ on the same axes.
(b) Sketch the section of this graph for $y = 0$ (i.e., the slice in the xz -plane).
(c) Sketch the 3D graph.

(6 points)