

# MATH 281 (PHILLIPS), FALL 2020: WRITTEN HOMEWORK 1

N. CHRISTOPHER PHILLIPS

This homework assignment is due Friday 2 Oct. 2020 at 10:00 pm, to be uploaded as a pdf file (or one of a few other allowed file types) on the University of Oregon Canvas site.

General instructions: show work, and be very careful to use fully correct notation. Incorrect notation will lose credit on exams (grading is based on what you write, not what you meant), and the written homework assignments are your chance to have me tell you whether your notation is correct.

Files turned in must have good enough resolution that I can read them easily.

Apart from the extension (such as “.pdf”), your file name should contain only numbers, capital and lowercase letters, and underscores. In particular, **no** spaces or parentheses.

Special instructions for this assignment, intended as practice for later. There are two problems. Write your solutions on two separate pages. Then scan or photograph the pages separately, and afterwards combine the images in the correct order into a single file (presumably pdf; **not** Microsoft Word) for submission to Canvas.

**Problem 1** (15 points). Define vectors in  $\mathbb{R}^3$  by  $\mathbf{v} = \langle -1, 3, -2 \rangle$  and  $\mathbf{w} = \langle 2, -4, -5 \rangle$ . Find:

- (1)  $\mathbf{v} - \mathbf{w}$ .
- (2)  $|\mathbf{w}|$  (also written  $\|\mathbf{w}\|$ ).
- (3)  $(-2)\mathbf{v}$ .
- (4)  $\mathbf{v} \cdot \mathbf{w}$  (also written  $\langle \mathbf{v}, \mathbf{w} \rangle$ ).
- (5)  $\mathbf{w} \cdot (2\mathbf{w} - \mathbf{v})$  (also written  $\langle \mathbf{w}, 2\mathbf{w} - \mathbf{v} \rangle$ ).

In all cases, show at least one intermediate step, and be sure to use enough parentheses.

**Problem 2** (10 points). Show that the equation

$$x^2 + y^2 + z^2 - 4x + 6y - 2z + 10 = 0$$

determines a sphere in  $\mathbb{R}^3$ , and find its center and radius.

Hint: Complete the square. See Chapter 12.1 Example 6 in the book.

Be sure to only write “=” between expressions you are actually claiming are equal, and be sure to use enough parentheses.