MATH 281 (PHILLIPS), FALL 2020: WRITTEN HOMEWORK 2

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This homework assignment is due Friday 9 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 in all problems, 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.

Write your name on all pages.

Problem 1 (3 points)**.** Find

$$\det \begin{pmatrix} 2 & t & -3 \\ -1 & 3 & -y \\ -2 & -4 & 4 \end{pmatrix}.$$

Problem 2 (12 points)**.** Define vectors in $\mathbb{R}^3$ by

$$\mathbf{u} = \langle 1,\, 4,\, -3 \rangle, \qquad \mathbf{v} = \langle -1,\, 3,\, -2 \rangle, \qquad \text{and} \qquad \mathbf{w} = \langle 2,\, -4,\, -5 \rangle.$$

Find:

(1) $\mathbf{v} \times \mathbf{w}$.
(2) The area of the parallelogram spanned by $\mathbf{v}$ and $\mathbf{w}$.
(3) The volume of the parallelopiped spanned by $\mathbf{u}$, $\mathbf{v}$, and $\mathbf{w}$.
(4) All unit vectors orthogonal to both $\mathbf{u}$ and $\mathbf{w}$.

Problem 3 (10 points)**.**

(1) Find all vectors $\mathbf{v}$ such that

$$\langle 1,\, 2,\, 1 \rangle \times \mathbf{v} = \langle 3,\, 1,\, -5 \rangle.$$

(2) Explain, without trying to solve equations, why there is no vector $\mathbf{w}$ such that

$$\langle 1,\, 2,\, 1 \rangle \times \mathbf{w} = \langle 3,\, 1,\, 5 \rangle.$$

Date: 6 October 2020.