MATH 281 (PHILLIPS), FALL 2020: WRITTEN HOMEWORK 3

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This homework assignment is due Friday 16 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. You do not need to put any identifying information in the file name; "`HW3.pdf`" is quite sufficient. (The Canvas system adds enough identifying information.)

Write your name on all pages.

Problem 1 (5 points)**.** Determine where the lines given by the parametric equations

$$\mathbf{r}_1(t) = \langle 1, 1, 0\rangle + t\langle 1, -1, 2\rangle \qquad \text{and} \qquad \mathbf{r}_2(t) = \langle 2, 0, 2\rangle + t\langle -1, 1, 0\rangle$$

intersect. Be sure your claimed intersection point really is one!

Problem 2 (8 points)**.** Describe and sketch the surface

$$x^2 + \frac{y^2}{4} = z^2 - 2z.$$

Be sure to describe the traces in planes parallel to each the the coordinate planes.

Problem 3 (6 points)**.** Find

$$\lim_{t\to 2} \left\langle \frac{t^2-4}{t-2},\ \sqrt{t+7},\ \frac{\sin(t-2)}{6t-12} \right\rangle.$$

Simplify your answer.

Problem 4 (6 points)**.** Consider the parametrized plane curve $\mathbf{r}(t) = \langle -t^2, -t^3\rangle$. Find $\mathbf{r}'(t)$. Sketch the curve, with an arrow to indicate the direction in which t increases. In your sketch, identify the position vector $\mathbf{r}(1)$ and draw the tangent vector $\mathbf{r}'(1)$.

Date: 13 October 2020.