Math 8: Calculus in one and several variables
Spring 2018 - Homework 5

Return date: Wednesday 05/02/18

---

keywords: *lines, planes, space curves*

Instructions: Write your answers neatly and clearly on straight-edged paper, use complete sentences and label any diagrams. Please show your work; no credit is given for solutions without work or justification.

exercise 1. *(3 points)* Find the parametric equation for the following lines

a) The line L_1 that passes through the points $P = (3, 0, 1)$ and $Q = (5, 1, 2)$.

b) The line of intersection L of the planes $E_1 : 2x - y + 3z = 0$ and $E_2 : x + y + 2z = 2$.

Show your work.

exercise 2. *(3 points)* Find an equation of the plane that passes through the points $P = (1, 0, 5)$ and $Q = (3, 1, 1)$ and is perpendicular to the plane $E_1 : 2x + y + 3z = 6$.
Show your work.

exercise 3. *(2 points)* Find an equation for the plane consisting of all points that are equidistant for the points $P = (5, 1, 5)$ and $Q = (2, 6, 3)$. Explain how you have obtained your result.

exercise 4. *(4 points)*

a) Find the domain of the curve $\mathbf{r}(t) = \langle \ln(\frac{7-6}{-2}), \frac{t^2}{2t^2-25}, \sqrt{9-t^2} \rangle$.

b) Evaluate the limit $\lim_{t \to 1^-} \langle \frac{\cos(3(t-1))-1}{2t^2}, \frac{t-1}{t^2-1}, \frac{\sqrt{1-t^4}}{t-1} \rangle$.

Show your work.

exercise 5. *(4 points)* Sketch the curves with the given vector equation. Indicate with an arrow the direction in which t increases.

a) $\mathbf{r}(t) = \langle \sin(t), t \rangle$ in $\mathbb{R}^2$.

c) $\mathbf{r}(t) = \langle \cos(\pi \cdot t), t, \sin(\pi \cdot t) \rangle$ in $\mathbb{R}^3$.

exercise 6. *(4 points)* Give parametric equations for the following curves:

a) the ellipse $\frac{x^2}{16} + \frac{y^2}{25} = 1$ in $\mathbb{R}^2$.

b) the curve of intersection of the surfaces

$$y = x^2 \quad \text{and} \quad x^2 + z^2 = 4.$$
