

**Instructions**

- Show all the details of your work and carefully explain the way you have solved problems. Failure to comply with this requirement will automatically and deterministically place you on a list of students that have to meet me during office hours and explain their solution, your temporary grade will be 0.
- You can answer in soft form or scan extremely legible written answers.
- Please attach the quiz form with your name and student id to your answer sheets.
- Please submit all your work including scratch papers and write your name on every paper you submit
- Please make and document reasonable assumptions
- **Graduate students have to solve all the questions including questions / sections with bold font.** Undergraduate students are exempt from questions/sections with bold font.
- Use the last digit of your Texas State student id to figure your individual parameters (from Table 1). Note that the parameters are used as vectors and/or as vertices/points depending on the questions. For example if your student id is 12345678, the use 8 as an entry to table and use the parameters:

Last digit	$u_x$	$u_y$	$u_z$	$v_x$	$v_y$	$v_z$	$w_x$	$w_y$	$w_z$	$t_x$	$t_y$	$t_z$
8	7	5	3	4	4	4	5	7	3	7	4	9

**Question**

1. Use your individual parameters and:

- a. Given a plan A, defined by the vectors  $\vec{u} = (u_x, u_y, u_z, 0)$  and  $\vec{v} = (v_x, v_y, v_z, 0)$  and a plan B defined by the vectors  $\vec{w} = (w_x, w_y, w_z, 0)$  and  $\vec{t} = (t_x, t_y, t_z, 0)$  **find the cosine of the angle between the normal** to the plan A and the normal to the plan B.

Find the two normal vectors

Find the angle between these two normal vectors

- b. **Consider the vector  $\vec{v} = (v_x, v_y, v_z, 0)$ , and find the coordinates of a new vector  $\vec{s} = (s_x, s_y, s_z, 0)$ , such that the vector  $\vec{s}$  is perpendicular to the vector  $\vec{v}$ .**

**You are supposed to find a new vector S**

**Individual parameters**

	$u_x$	$u_y$	$u_z$	$v_x$	$v_y$	$v_z$	$w_x$	$w_y$	$w_z$	$t_x$	$t_y$	$t_z$
0	4	1	7	2	6	7	5	8	3	2	9	4
1	7	5	3	4	4	4	5	7	3	7	4	9
2	6	5	4	6	8	4	3	6	4	5	4	6
3	2	2	4	7	3	7	3	6	4	2	5	5
4	4	8	6	3	8	3	5	6	8	3	7	6
5	7	9	8	2	7	6	6	5	7	4	5	7
6	5	4	2	2	3	5	2	8	9	7	6	6
7	8	9	6	7	4	7	6	4	4	4	8	7
8	3	5	2	3	4	5	5	2	6	9	3	2
9	5	8	7	6	2	3	3	6	7	3	9	7