

CPSC 314

Theory Review 1

August 26, 2013

1. (1 point) Vectors

$$a = \begin{pmatrix} 1 \\ -2 \\ 4 \end{pmatrix} \quad b = \begin{pmatrix} -2 \\ 5 \\ 3 \end{pmatrix}$$

- compute $a \cdot b$,
- compute $a^T b$
- compute $a \times b$
- compute $b \times a$

2. (1 point) Matrices

$$A = \begin{pmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ -4 & 1 & 3 \end{pmatrix} \quad B = \begin{pmatrix} 3 & 1 & 6 \\ 1 & 2 & 2 \\ 1 & -1 & 2 \end{pmatrix}$$

- Compute $C = AB$.
- Does $AB = BA$?

- Given the vector a from the previous question, compute $c = Aa$.
- Given the vector a from the previous question, compute $d = a^T A$.

3. (1 point) Normals and Planes

T is a triangle in 3D with vertices $P_1 = (1, 1, 0)$, $P_2 = (1, 0, 2)$ and $P_3 = (3, 2, 0)$ (counterclockwise around the normal).

- Compute the normal to T .
- Compute the area of T .
- Compute the implicit plane equation $Ax + By + Cz + D = 0$ for the plane that T lies in.

4. (1 point) Segments and Lines

Given two segments in 2D: S_1 from $(0, 1)$ to $(-1, 2)$ and S_2 from $(0, 0)$ to $(2, 2)$,

- Does the point $P = (0, 1)$ lie on S_1 ?
- Do S_1 and S_2 intersect? If yes, compute the intersection, if no, explain.

5. (1 point) Frames

Specify the coordinates of point P with respect to coordinate frames A, B and C.

