Project 3D data onto a 2D subspace

TOTAL POINTS 6

1.Question 1

For a vector $\mathbf{x}=[6\ 0\ 0]$ and the subspace U spanned by the basis vectors $\mathbf{b}_1=[1\ 1\ 1]$ and $\mathbf{b}_2=[0\ 1\ 2]$, which of the following statements are true?

You can use the formula slide that comes with the corresponding lecture.

4 / 4 points

- [ ] The coordinates of the projected point with respect to $\mathbf{b}_1,\mathbf{b}_2$ are $[0\ 0]$.
- [x] The projection of $\mathbf{x}$ onto U is $[5\ 2\ -1]$
- [ ] The projection matrix is $[0\ 0\ 0]$, $[0\ 1\ 2]$, $[0\ 2\ 4]$
- [x] The projection matrix is $1/6\ [[5\ 2\ -1], [2\ 2\ 2], [-1\ 2\ 5]]$
- [ ] The projection matrix is not symmetric.
- [x] The projection matrix is symmetric.
- [ ] The projection of $\mathbf{x}$ onto U is $[0\ 0\ 0]$
- [x] The coordinates of the projected point with respect to $\mathbf{b}_1,\mathbf{b}_2$ are $[5\ -3]$.
- [ ] The rank of the projection matrix is 1.

2.Question 2

Project $[3\ 2\ 2]$ onto the subspace spanned by $[1\ 0\ 0]$ and $[0\ 1\ 1]$

You can use the formula slide that comes with the corresponding lecture.

1 / 1 point

- ( ) $[2\ 1\ 1]$
- (•) $[3\ 2\ 2]$
- ( ) $[2\ 1\ 2]$
- ( ) $[6\ 4\ 4]$

3.Question 3

1. Project $[12\ 0\ 0]$ onto the subspace $U1$ spanned by $[1\ 1\ 1]$, $[0\ 1\ 2]$

2. Project the result from 1. onto the subspace spanned by

$[-10\sqrt{6}\ -4\sqrt{6}\ 2\sqrt{6}]$. What is the final projection?

Hint: For step 2. you do not necessarily need to compute anything.

You can use the formula slide that comes with the corresponding lecture.

1 / 1 point

- $[10\ 4\ -2]$
- $[5\ 2\sqrt{6}\ -1\sqrt{6}]$
- $[5 \quad 2\sqrt{6}+1 \quad -\sqrt{6}+2]$