Your grade: 100%

Your latest: 100% • Your highest: 100% • To pass you need at least 80%. We keep your highest score.

Next item →

1. Compute the projection matrix that allows us to project any vector $\mathbf{x} \in \mathbb{R}^3$ onto the subspace spanned by the basis vector $\mathbf{b} = \begin{bmatrix} 1 \\ 2 \\ 2 \end{bmatrix}$. 2 / 2 points

Do the exercise using pen and paper. You can use the formula slide that comes with the corresponding lecture.

- ○ $\begin{bmatrix} 1 & 2 & 2 \\ 2 & 4 & 4 \\ 2 & 4 & 4 \end{bmatrix}$
- ○ $\begin{bmatrix} \frac{1}{9} \end{bmatrix}$
- ◉ $\frac{1}{9}\begin{bmatrix} 1 & 2 & 2 \\ 2 & 4 & 4 \\ 2 & 4 & 4 \end{bmatrix}$

✓ **Correct**
Well done!

2. Given the projection matrix 2 / 2 points

$$\frac{1}{25}\begin{bmatrix}9 & 0 & 12\\ 0 & 0 & 0\\ 12 & 0 & 16\end{bmatrix}$$

project $\begin{bmatrix}1\\1\\1\end{bmatrix}$ onto the corresponding subspace, which is spanned by $\mathbf{b} = \begin{bmatrix}3\\0\\4\end{bmatrix}$.

Do the exercise using pen and paper.

- ○ $\begin{bmatrix}3\\0\\4\end{bmatrix}$
- ○ $\frac{1}{25}\begin{bmatrix}5\\10\\10\end{bmatrix}$
- ○ $\begin{bmatrix}21\\0\\28\end{bmatrix}$
- ◉ $\frac{1}{25}\begin{bmatrix}21\\0\\28\end{bmatrix}$

Correct
Good job!

3. Now, we compute the **reconstruction error**, i.e., the distance between the original data point and its projection onto a lower-dimensional subspace. 1 / 1 point

Assume our original data point is $\begin{bmatrix}1\\1\\1\end{bmatrix}$ and its projection $\frac{1}{9}\begin{bmatrix}5\\10\\10\end{bmatrix}$. What is the reconstruction error?

0.47

Correct
Well done!