### Projection onto a 1-dimensional subspace

5/5 points (100.00%)

Quiz, 3 questions

## ✓ Congratulations! You passed!

Next Item



2/2 points

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  $\mathbf{b} = egin{bmatrix} 1 \ 2 \ 2 \end{bmatrix}$  .

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

- $\bigcirc$
- $\begin{bmatrix}
  1 & 2 & 2 \\
  2 & 4 & 4 \\
  2 & 4 & 4
  \end{bmatrix}$
- $\begin{array}{c|cccc}
   & 1 & 2 & 2 \\
   & 2 & 4 & 4 \\
   & 2 & 4 & 4
  \end{array}$

Correct

Well done!

# Projection onto a 1 dimensional subspace

5/5 points (100.00%)

Quiz, 3 questions

2.

Given the projection matrix

$$\begin{array}{c|cccc}
1 & 9 & 0 & 12 \\
\hline
0 & 0 & 0 \\
\hline
12 & 0 & 16
\end{array}$$

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

Correct

Good job!

$$\begin{bmatrix} 21 \\ 0 \\ 28 \end{bmatrix}$$

1/1 points

3.

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

### Projection on transidua cassional subspace

5/5 points (100.00%)

Quiz, 3 questions

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

What is the reconstruction error?

0.4714

#### **Correct Response**

Well done!



3 of 3