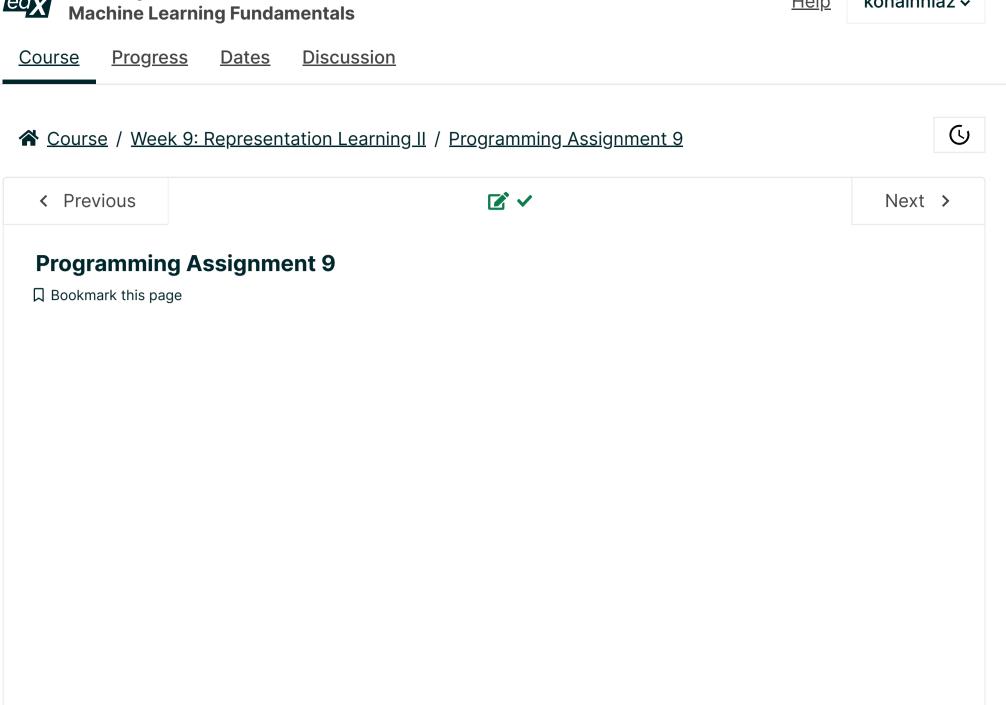


<u>Help</u>

konainniaz 🗸



Click this link to download the PCA MNIST notebook and then complete problems 1-4.

Problem 1	Pr	oh	lem	1
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1/1 point (graded)

Let the function $F_k\left(x\right)$ denote the operation of taking a handwritten digit image $x\in\mathbb{R}^{784}$, projecting it to k dimensions using PCA, and then reconstructing an image in \mathbb{R}^{784} from the projection alone. Which of the following alternatives best describes the function $F_k\left(x\right)$?

O It is a nonlinear function that combines a linear operation (projection) with a nonlinear operation (reconstruction).
It is a nonlinear function that combines a nonlinear operation (projection) with another nonlinear operation (reconstruction).
It is a linear function that can be represented by a single matrix.
\bigcirc It is the product of $m{k}$ nonlinear functions.
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Problem 2

2/2 points (graded)

In the notebook, we defined a function **show_digit** that takes a 784-dimensional vector and then

- ullet clips all entries in the vector to lie in the range [0,255],
- ullet converts the vector into a 28 imes28 array, and
- displays the image represented by this array of grayscale values.

To explain why the first step---clipping the entries---is needed, say whether each of the following statements is **true** or **false**.

a) The original MNIST images occasionally have pixel values that do not lie in the range [0,255].

○ True			
False			

b) The reconstructed images $F_k\left(x
ight)$ may have pixel values that do not lie in the range [0,255].

True		
O False		
- Caralse		



Droblom 2	
Problem 3	•
using the enti determine the	ok, for any desired dimension $m{k}$, we determined the PCA projection to $m{k}$ dimensions ire data set, and then used this one projection for all images. Instead, we could PCA projection (to $m{k}$ dimensions) for each individual digit, and we could then project sing the projection for the corresponding digit. What is a potential benefit of the latter
O It is pote	entially more space-efficient.
It poten	tially preserves more information about each image.
O The pro	jection operation is potentially faster.
O None of	the above.
~	
Submit	
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