QUIZ • 10 MIN

# Principal Component Analysis

**Submit your assignment**
**DUE** Nov 11, 1:29 PM IST **ATTEMPTS** 3 every 8 hours

**Receive grade**
**TO PASS** 80% or higher

**Congratulations! You passed!**
**TO PASS** 80% or higher

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**GRADE**
100%

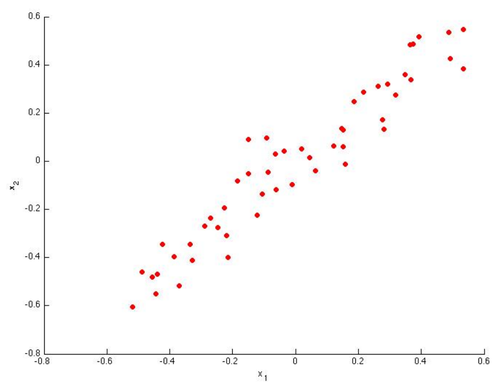
## Principal Component Analysis

**LATEST SUBMISSION GRADE**
100%

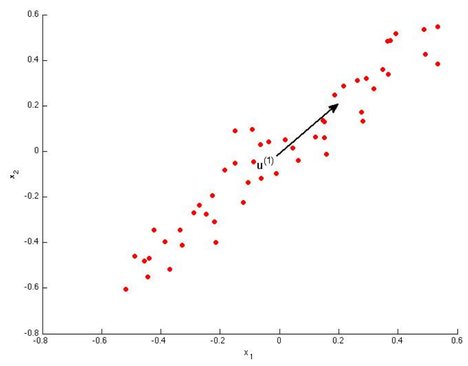
Try again

**1. Consider the following 2D dataset:** **1 / 1 point**

Grade View Feedback



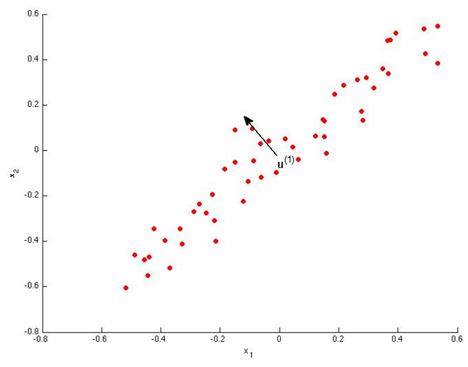

**Which of the following figures correspond to possible values that PCA may return for $u^{(1)}$ (the first eigenvector / first principal component)? Check all that apply (you may have to check more than one figure).**

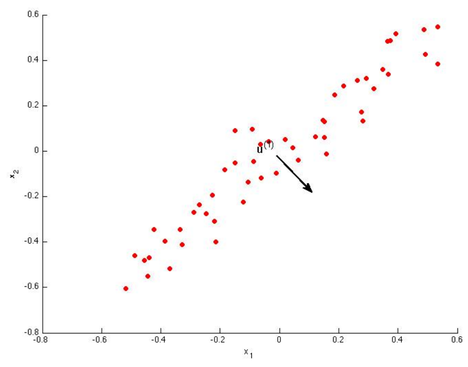



**Correct**
The maximal variance is along the y = x line, so this option is correct.




**Correct**
The maximal variance is along the y = x line, so the negative vector along that line is correct for the first principal component.




**2. Which of the following is a reasonable way to select the number of principal components $k$?** **1 / 1 point**

**(Recall that $n$ is the dimensionality of the input data and $m$ is the number of input examples.)**

- Choose $k$ to be 99% of $n$ (i.e., $k = 0.99 * n$, rounded to the nearest integer).
- Choose $k$ to be the smallest value so that at least 1% of the variance is retained.
- Choose the value of $k$ that minimizes the approximation error $\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)} - x_{\text{approx}}^{(i)}||^2$.
- (selected) Choose $k$ to be the smallest value so that at least 99% of the variance is retained.

**Correct**
This is correct, as it maintains the structure of the data while maximally reducing its dimension.

**3. Suppose someone tells you that they ran PCA in such a way that "95% of the variance was retained." What is an equivalent statement to this?** **1 / 1 point**

- $\frac{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)}||^2}{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)} - x_{\text{approx}}^{(i)}||^2} \leq 0.05$
- $\frac{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)}||^2}{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)} - x_{\text{approx}}^{(i)}||^2} \geq 0.05$
- $\frac{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)}||^2}{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)} - x_{\text{approx}}^{(i)}||^2} \leq 0.95$
- (selected) $\frac{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)} - x_{\text{approx}}^{(i)}||^2}{\frac{1}{m}\sum_{i=1}^{m} ||x^{(i)}||^2} \leq 0.05$

**Correct**
This is the correct formula