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## Projections Exercises

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Homework due Nov 13, 2023 10:13 CST Completed

We will continue to use this dataset:

```
library(Biobase)
library(GSE5859Subset)
data(GSE5859Subset)
```

## Projections Exercises #1

1/1 point (graded)

Suppose you want to make an MA plot of the first two samples `y = geneExpression[,1:2]`. Which of the following projections of  $\mathbf{y}$  gives us new coordinates such that column 2 versus column 1 is an MA plot?

☐  $\mathbf{y} \begin{pmatrix} 1/\sqrt{2} & 1/\sqrt{2} \\ 1/\sqrt{2} & -1/\sqrt{2} \end{pmatrix}$

☒  $\mathbf{y} \begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix}$

☐  $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \mathbf{y}$

☐  $\begin{pmatrix} 1 & 1 \\ 1 & -1 \end{pmatrix} \mathbf{y}'$



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## Projections Exercise #2

1/1 point (graded)

Say  $\mathbf{Y}$  is  $M \times N$ , in the SVD  $\mathbf{Y} = \mathbf{U}\mathbf{D}\mathbf{V}^\top$  which of the following is **NOT** correct?

☐  $\mathbf{D}\mathbf{V}^\top$  are the new coordinates for the projection  $\mathbf{U}^\top \mathbf{Y}$

☐  $\mathbf{U}\mathbf{D}$  are the new coordinates for the projection  $\mathbf{Y}\mathbf{V}$

☒  $\mathbf{D}$  are the coordinates of the projection  $\mathbf{U}^\top \mathbf{Y}$

☐  $\mathbf{U}^\top \mathbf{Y}$  is a projection from an  $M$ -dimensional to  $N$ -dimensional subspace.



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