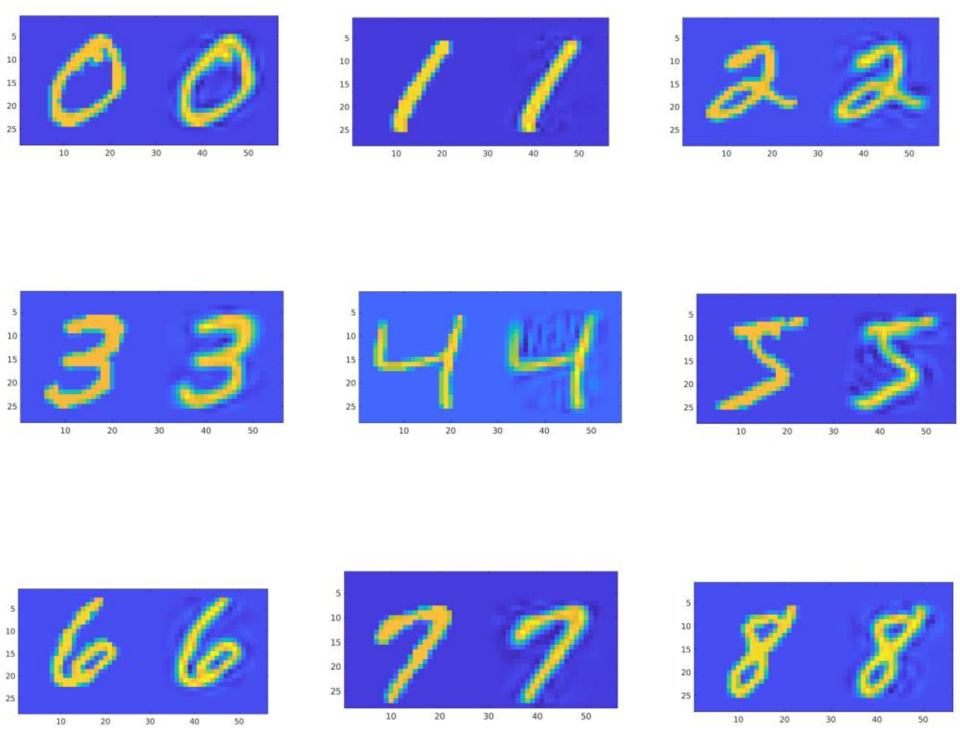
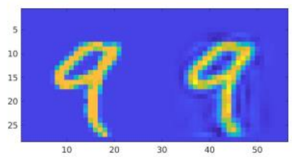
PROBLEM 5

Let X_{raw} be the $n \times p$ data matrix with n rows (data points) and p columns (variables). After subtracting mean μ from each row we get centered data matrix X.
Let V be the $p \times k$ matrix of the k eigenvectors with largest eigenvalues. The the $n \times k$ matrix of PCA projections will be $Z = XV$ (Z is PCA Scores)
To reconstruct the original two variables from this one principal component, we map it back to p dim. with V^T. The result is then given by $\hat{X} = ZV^T = XVV^T$. To get final reconstruction $\hat{X}_{raw}$, we add mean μ so that

PCA reconstruction = PC scores . Eigenvectors^T + Mean

Original Images(left) and Reconstructed Images(right)

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