Matlab Competency Check

1. Define a $50 \times 50$ matrix called $M$. The entries of $M$ should be random integers between 0 and 5. (Hint: try the `randi` command.)

   **Solution:** $M = \text{randi}(6,50)-1$;

2. Access the element in the 27th row and the 32nd column, and display this element in hexadecimal form.

   **Solution:** `format hex; M(27,32)`

3. Set every element of $M$ which happens to be a 5 to 6. Call this modified matrix $N$.

   **Solution:** $\text{idx} = \text{find}(M == 5); \ N = M; \ N(\text{idx}) = 6$;

4. Form a histogram showing how many times each element of $N$ occurs (hint: try the `hist` command.)

   **Solution:** `hist(N(:),6);`

5. Extract the $4 \times 4$ sub-matrix in the center of $N$, and store this submatrix as the variable $P$.

   **Solution:** $P = N(24:27,24:27)$;

6. Calculate the inverse of $P$, and call it $Q$. (Hint: try the `inv` command.)

   **Solution:** $Q = \text{inv}(P)$;

7. Form the matrix products $P \cdot Q$ and $Q \cdot P$ and verify that both products yield the identity matrix.

   **Solution:** $P*Q; \ Q*P$;

8. Multiply $P$ and $Q$ together element-wise and call the output $S$.

   **Solution:** $S= P.*Q$;

9. Write code to replace the largest value of $S$ by 0. (Hint: use the `max` function.)

   **Solution:** $\text{idx} = \text{max(max}(S)) ; \ S(\text{idx}) = 0$;