① Can one uses Spark over Hadoop? Explain in couple of lines.

② Limitation of Mongo DB.

③ Calculate correlation b/w X & Y

X :	17	18	19	19	20	20	21	21	22	23
Y :	12	16	14	11	15	19	22	26	15	20

④ Show that
$x = \left[\frac{1}{3}, -\frac{2}{3}, -\frac{2}{3}\right]$ and $y = \left[\frac{2}{3}, -\frac{1}{3}, \frac{2}{3}\right]$ are orthogonal.

⑤ Check if $12\hat{i} + 4\hat{j} - 6\hat{k}$ is parallel or $\perp$ to $6\hat{i} + 2\hat{j} - 3\hat{k}$

⑥ Find inverse of $\begin{bmatrix} 1 & -1 & 3 \\ -1 & 1 & 2 \\ 3 & 2 & -1 \end{bmatrix}$

⑦ $v_1 = (1, 2, 3]$; $v_2 = [0, 0, 2]$; $v_3 = [0, 0, 3]$ are linearly independent or dependent? Show.

⑧ Show that rotation of (x, y) via $\begin{bmatrix} \cos\theta & -\sin\theta \\ \sin & \cos\theta \end{bmatrix}$ is a linear transformation

(9) Write Rank-Nullity theorem. What is rank of null.

(10) $X = (1, 0, -3)$
Find Manhattan Norm & L_2 norm.

(11)  is a space or set. Is it a connex or not?

(12) Let $u_1 = \begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}$, $u_2 = \begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$ is an orthogonal basis of for $W = \text{span}\{u_1, u_2\}$. Write $y = \begin{bmatrix} 0 \\ 3 \\ 1 \end{bmatrix}$ as the sum of vector in W. and a vector orthogonal to W.

(13) Calculate the eigenvalue of $A = \begin{bmatrix} 1 & 0 & -1 \\ 1 & 2 & 1 \\ 2 & 2 & 3 \end{bmatrix}$

(14) $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ is P.S.D. or not?

(15) We know that one can write $A = PDP^{-1}$.
Show that $A^n = PD^nP^{-1}$.

(16) $A = \begin{pmatrix} 3 & 2 \\ 2 & 3 \end{pmatrix}$ has eigenvalue as $\lambda_1 = 1$, $\lambda_2 = 5$ & corresponding eigenvectors $v_1 = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$ + $v_2 = \begin{pmatrix} 1 \\ 1 \end{pmatrix}$, respectively
Write the Spectral decomposition

(17) Write $A = \begin{pmatrix} 4 & 11 & 14 \\ 8 & 7 & -2 \end{pmatrix}$ in SVD form.

(18) What is pseudo inverse? Estimate or calculate for (17)

(19) What is $\|A\|_1$ & $\|A\|_\infty$ for $A = \begin{bmatrix} 5 & -4 & 2 \\ -1 & 2 & 3 \\ -2 & 1 & 0 \end{bmatrix}$

(20) Write the steps of PCA.

(21) Write the formula for the within-class scatter matrix for LDA.

(22) What is right-pseudo inverse. Is it used for ~~overd~~ overdetermined system or underdetermined system?

(23) What is Minimum Normed solution and where it is used?

(24) R^2 → Goodness of fitting

(25) Usage of Polynomial regression.

(26) T.P., T.N., F.P., F.N. is provided. write the confusion matrix

(27) Usage of sigmoid function in classification problem?

(28) Wat is log-it of $p(x)$

(29) How logistic regression in difference from linear regression?

(30) What is F1 score.

These question are just for practice. You may get different question from this.