Very Short Answer Questions: (1 Mark Each)

1. Find $A+B$, where $A = \begin{pmatrix} 2 & \sqrt{3} \\ -1 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} \sqrt{2} & 1 \\ -3 & \sqrt{5} \end{pmatrix}$.
2. Calculate $A+B$, given $A = \begin{pmatrix} -2 & 5 \\ 3 & \pi \end{pmatrix}$ and $B = \begin{pmatrix} 7 & -5 \\ -3 & 2 \end{pmatrix}$.
3. Find $A+B$, with $A = \begin{pmatrix} \sqrt{5} & -\sqrt{2} \\ \sqrt{3} & \sqrt{7} \end{pmatrix}$ and $B = \begin{pmatrix} -\sqrt{5} & \sqrt{2} \\ -\sqrt{3} & -\sqrt{7} \end{pmatrix}$.
4. Calculate $A+B$, where $A = \begin{pmatrix} 0 & \frac{1}{2} \\ \frac{2}{3} & -\frac{3}{4} \end{pmatrix}$ and $B = \begin{pmatrix} \frac{4}{5} & \frac{5}{6} \\ -\frac{6}{7} & -\frac{7}{8} \end{pmatrix}$.
5. Find $A+B$, given $A = \begin{pmatrix} -1 & \phi \\ e & -\pi \end{pmatrix}$ and $B = \begin{pmatrix} 1 & -\phi \\ -e & \pi \end{pmatrix}$, where ϕ is the golden ratio and e is the base of the natural logarithm.
6. Calculate $A+B$, with $A = \begin{pmatrix} \ln(2) & \ln(3) \\ \ln(5) & \ln(7) \end{pmatrix}$ and $B = \begin{pmatrix} -\ln(2) & -\ln(3) \\ -\ln(5) & -\ln(7) \end{pmatrix}$.
7. Calculate $A+B$, given $A = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ and $B = \begin{pmatrix} \sin(\theta) & \cos(\theta) \\ -\sin(\theta) & -\cos(\theta) \end{pmatrix}$.
8. Find $A+B$, with $A = \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}$ and $B = \begin{pmatrix} -\alpha & -\beta \\ -\gamma & -\delta \end{pmatrix}$, where α, β, γ, and δ are arbitrary constants.
9. Calculate $A+B$, where $A = \begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$ and $B = \begin{pmatrix} 4 & 3 \\ 2 & 1 \end{pmatrix}$.

Short Answer Questions: (2 Marks Each)

10. Given $A = \begin{pmatrix} \cos(x) & -\sin(x) \\ \sin(x) & \cos(x) \end{pmatrix}$ and $B = \begin{pmatrix} \cos(y) & \sin(y) \\ -\sin(y) & \cos(y) \end{pmatrix}$, find $A+B$.
11. Given $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ and $B = \begin{pmatrix} d & c \\ b & a \end{pmatrix}$, calculate $A+B$.
12. For $A = \begin{pmatrix} \alpha & \beta \\ \gamma & \delta \end{pmatrix}$ and $B = \begin{pmatrix} -\beta & \alpha \\ -\delta & \gamma \end{pmatrix}$, find $A+B$.

Long Answer Questions: (4 Marks Each)

13. Given $A = \begin{pmatrix} \sin(\theta) & \cos(\theta) \\ \cos(\theta) & -\sin(\theta) \end{pmatrix}$ and $B = \begin{pmatrix} \sin(\phi) & -\cos(\phi) \\ -\cos(\phi) & -\sin(\phi) \end{pmatrix}$, find $A+B$
14. For $A = \begin{pmatrix} \log(x) & \log(y) \\ \log(z) & \log(w) \end{pmatrix}$ and $B = \begin{pmatrix} \log(y) & \log(x) \\ \log(w) & \log(z) \end{pmatrix}$, calculate $A+B$ and explain how the properties of logarithms are reflected in the resulting matrix.

Answers:

1. $A+B = \begin{pmatrix} 2+\sqrt{2} & \sqrt{3}+1 \\ -4 & 4+\sqrt{5} \end{pmatrix}$.
2. $A+B = \begin{pmatrix} 5 & 0 \\ 0 & \pi+2 \end{pmatrix}$.
3. $A+B = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

4. $A+B=\begin{pmatrix} \frac{4}{5} & \frac{11}{6} \\ -\frac{8}{21} & -\frac{59}{32} \end{pmatrix}$.

5. $A+B=\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

6. $A+B=\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

7. $A+B=\begin{pmatrix} \sin(\theta) & \cos(\theta) \\ -\sin(\theta) & -\cos(\theta) \end{pmatrix}$.

8. $A+B=\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

9. $A+B=\begin{pmatrix} 5 & 5 \\ 5 & 5 \end{pmatrix}$.

10. $A+B=\begin{pmatrix} \cos(x)+\cos(y) & \sin(y)-\sin(x) \\ \sin(x)+\sin(y) & \cos(x)+\cos(y) \end{pmatrix}$.

11. $A+B=\begin{pmatrix} a+d & b+c \\ c+b & d+a \end{pmatrix}$.

12. $A+B=\begin{pmatrix} \alpha-\beta & \alpha+\beta \\ \gamma-\delta & \gamma+\delta \end{pmatrix}$.

13. $A+B=\begin{pmatrix} \sin(\theta)+\sin(\phi) & -\cos(\theta)-\cos(\phi) \\ \cos(\theta)-\cos(\phi) & -\sin(\theta)-\sin(\phi) \end{pmatrix}$. Discussion: This matrix combines rotational transformations in two dimensions, reflecting the sum of angles' sine and cosine functions. In physics, such matrices can represent rotations or oscillations, potentially applicable in quantum mechanics or wave theory.

14. $A+B=\begin{pmatrix} \log(x)+\log(y) & \log(x)+\log(y) \\ \log(z)+\log(w) & \log(z)+\log(w) \end{pmatrix}$. Explanation: The result showcases the logarithmic property $\log(ab)=\log(a)+\log(b)$, indicating the natural behavior of log functions in adding matrix elements, and reflecting the principle of log of product in the context of matrix operations.