

Let

$$A = \begin{bmatrix} 2 & 1 \end{bmatrix}, \quad B = \begin{bmatrix} -1 \\ 2 \end{bmatrix}, \quad C = \begin{bmatrix} -1 & 2 \\ 0 & 1 \end{bmatrix}, \quad D = \begin{bmatrix} 4 & 3 & 1 \\ 2 & 0 & -1 \end{bmatrix},$$

$$E = \begin{bmatrix} -1 & 0 & 4 \\ 2 & -1 & 3 \end{bmatrix}, \quad G = \begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}, \quad H = \begin{bmatrix} 0 & 1 \\ -1 & 0 \end{bmatrix}, \quad I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}.$$

Compute the following sums and products, if they exist.

1  $G + H$      
 2  $D + E$      
 3  $A + B$      
 4  $B + A$      
 5  $6E$

6  $AB$      
 7  $BA$      
 8  $AC$      
 9  $DI$      
 10  $ID$

11  $CD$      
 12  $A^T B^T$      
 13  $B^T A^T$      
 14  $(AB)^T$      
 15  $G^T + H^T$

16  $(G + H)^T$      
 17  $E^T H^T$      
 18  $H^T E^T$      
 19  $(EH)^T$      
 20  $(HE)^T$

**Answers:**

<span style="border: 1px solid black; padding: 2px;">1</span>	$\begin{bmatrix} 1 & 2 \\ 1 & 0 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">2</span>	$\begin{bmatrix} 3 & 3 & 5 \\ 4 & -1 & 2 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">3</span>	$\text{DNE}$	<span style="border: 1px solid black; padding: 2px;">4</span>	$\text{DNE}$	<span style="border: 1px solid black; padding: 2px;">5</span>	$\begin{bmatrix} -6 & 0 & 24 \\ 12 & -6 & 18 \end{bmatrix}$
<span style="border: 1px solid black; padding: 2px;">6</span>	$\begin{bmatrix} 0 \\ 0 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">7</span>	$\begin{bmatrix} -2 & 4 \\ -1 & 2 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">8</span>	$\begin{bmatrix} -2 & 5 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">9</span>	$\text{DNE}$	<span style="border: 1px solid black; padding: 2px;">10</span>	$\begin{bmatrix} 4 & 3 & 1 \\ 2 & 0 & -1 \end{bmatrix}$
<span style="border: 1px solid black; padding: 2px;">11</span>	$\begin{bmatrix} 0 & 2 & -3 \\ -3 & 0 & -1 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">12</span>	$\begin{bmatrix} -2 & 4 \\ -1 & 2 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">13</span>	$\begin{bmatrix} 0 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">14</span>	$\begin{bmatrix} 0 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">15</span>	$\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$
<span style="border: 1px solid black; padding: 2px;">16</span>	$\begin{bmatrix} 1 & 1 \\ 2 & 0 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">17</span>	$\begin{bmatrix} 2 & 1 \\ -1 & 0 \\ 3 & -4 \end{bmatrix}$	<span style="border: 1px solid black; padding: 2px;">18</span>	$\text{DNE}$	<span style="border: 1px solid black; padding: 2px;">19</span>	$\text{DNE}$	<span style="border: 1px solid black; padding: 2px;">20</span>	$\begin{bmatrix} 2 & 1 \\ -1 & 0 \\ 3 & -4 \end{bmatrix}$