3. Compute

(a) $\begin{pmatrix} -2 & 1 & 3 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \\ -2 \end{pmatrix} =$ $(-2)(-1) + 1(2) + 3(-2)$
$2 + 2 + (-6) = -2$

(b) $\begin{pmatrix} 0 & -1 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \\ -2 \end{pmatrix} =$ $0(-1) + (-1)(2) + 2(-2)$
$0 + (-2) + (-4) = -6.$

(c) $\begin{pmatrix} -2 & 1 & 3 \\ 0 & -1 & 2 \end{pmatrix} \begin{pmatrix} -1 \\ 2 \\ -2 \end{pmatrix} =$ $\begin{pmatrix} -2 \\ -6 \end{pmatrix}$

(d) $\begin{pmatrix} -2 & 1 & 3 \\ 0 & -1 & 2 \end{pmatrix} \begin{pmatrix} -3 \\ 2 \\ 1 \end{pmatrix} =$ $\begin{pmatrix} 11 \\ 0 \end{pmatrix}$

(e) $\begin{pmatrix} -2 & 1 & 3 \\ 0 & -1 & 2 \end{pmatrix}_{2\times 3} \begin{pmatrix} -1 & -3 \\ 2 & 2 \\ -2 & 1 \end{pmatrix}_{3\times 2} =$ $\begin{pmatrix} -2 & 11 \\ -6 & 0 \end{pmatrix}_{2\times 2}$

(f) Which of the three algorithms for computing $C := AB$ do parts (c)-(e) illustrate? (Circle the correct one.)

- Matrix-matrix multiplication by columns.
- Matrix-matrix multiplication by rows.
- Matrix-matrix multiplication via rank-1 updates.

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