E1.3.2 Exam Question 2

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Exam 1 due Oct 31, 2023 09:12 IST Completed

Question 2

6/6 points (graded)

Determine the matrix A so that

$$A\begin{pmatrix}0\\1\end{pmatrix}=\begin{pmatrix}1\\2\\-1\end{pmatrix} \quad \text{and} \quad A\begin{pmatrix}-1\\1\end{pmatrix}=\begin{pmatrix}1\\3\\0\end{pmatrix}.$$

$A =$

0	✔ Answer: 0	1	✔ Answer: 1
-1	✔ Answer: -1	2	✔ Answer: 2
-1	✔ Answer: -1	-1	✔ Answer: -1

Answer: $A\begin{pmatrix}0\\1\end{pmatrix}=\begin{pmatrix}1\\2\\-1\end{pmatrix}$ so we know that the second column of A equals $\begin{pmatrix}1\\2\\-1\end{pmatrix}$.

Now, we want to figure out what $A\begin{pmatrix}1\\0\end{pmatrix}$ equals. We notice that

$$\begin{pmatrix}1\\0\end{pmatrix}=\begin{pmatrix}0\\1\end{pmatrix}-\begin{pmatrix}-1\\1\end{pmatrix}.$$

Thus

$$A(\begin{pmatrix}1\\0\end{pmatrix})=A(\begin{pmatrix}0\\1\end{pmatrix}-\begin{pmatrix}-1\\1\end{pmatrix})=A\begin{pmatrix}0\\1\end{pmatrix}-A\begin{pmatrix}-1\\1\end{pmatrix}=\begin{pmatrix}1\\2\\-1\end{pmatrix}-\begin{pmatrix}1\\3\\0\end{pmatrix}=\begin{pmatrix}0\\-1\\-1\end{pmatrix}.$$

Thus,

$$A=\begin{pmatrix}0&1\\-1&2\\\end{pmatrix}.$$

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