UTAustinX UT.5.05x
Linear Algebra - Foundations to Frontiers

Help

sandipan_dey ⌄

Course   Progress   Dates   Discussion   Syllabus   Outline   Iaff routines   Community

🏠 Course / Exam 2 / E2.3 Exam 2

Previous   ☑ ✓   ☑ ✓   ☑ ✓   ☑ ✓   ☑ ✓   Next

E2.3.2 Questions 3-4

🔖 Bookmark this page

Exam 2 due Dec 3, 2023 04:42 IST   Completed

E2.3.2 Questions 3-4

Question 3

17/17 points (graded)
(10 points)
Compute

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

[-2] ✔ Answer: -2

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

[-4] ✔ Answer: -4

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

[-3] ✔ Answer: -3   [3] ✔ Answer: 3

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

[-2] ✔ Answer: -2   [-4] ✔ Answer: -4

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

[-2] ✔ Answer: -2   [-4] ✔ Answer: -4

[-3] ✔ Answer: -3   [3] ✔ Answer: 3

🖩 Calculator

(f) $\begin{pmatrix} -2 & 1 & 3 \\ 1 & -1 & 0 \\ 0 & 1 & 1 \end{pmatrix}$

| -2 | ✔ Answer: -2 | -4 | ✔ Answer: -4 |

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

| -3 | ✔ Answer: -3 | 3 | ✔ Answer: 3 |

| 0 | ✔ Answer: 0 | -2 | ✔ Answer: -2 |

$\Bigg) =$

(g) Which of the three algorithms for computing $C := AB$ do parts (c)-(f) illustrate?

○ Matrix-matrix multiplication by columns.

● Matrix-matrix multiplication by rows.

○ Matrix-matrix multiplication via rank-1 updates.

✔

-

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

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

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

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

Answer: Notice that you can reuse results from (a) and (b).

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

Answer: Notice that you can reuse results from (d) and (c).

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

Answer: Notice that you can reuse results from (e)

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

⊞ Calculator

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

Submit

ⓘ Answers are displayed within the problem

Question 4

15.0/15.0 points (graded)
Consider

$$A = \begin{pmatrix} 1 & -1 & 2 \\ 2 & 0 & 2 \\ -2 & 0 & -4 \end{pmatrix} \quad \text{and} \quad b = \begin{pmatrix} 7 \\ 4 \\ -10 \end{pmatrix}.$$

Solve $Ax = b$

$x =$

-1	✔ Answer: -1
-2	✔ Answer: -2
3	✔ Answer: 3

Give unit lower triangular matrix L and upper triangular matrix U so that $A = LU$.

$L =$

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

$U =$

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

▦ Calculator

(a) (10 points)

Solve $Ax = b$ **Answer:**   I choose to use an appended system and Gauss transforms:

$$\begin{pmatrix} 1 & 0 & 0 \\ -2 & 1 & 0 \\ 2 & 0 & 1 \end{pmatrix} \left(\begin{array}{ccc|c} 1 & -1 & 2 & 7 \\ 2 & 0 & 2 & 4 \\ -2 & 0 & -4 & -10 \end{array} \right) = \left(\begin{array}{ccc|c} 1 & -1 & 2 & 7 \\ 0 & 2 & -2 & -10 \\ 0 & -2 & 0 & 4 \end{array} \right)$$

$$\begin{pmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 1 & 1 \end{pmatrix} \left(\begin{array}{ccc|c} 1 & -1 & 2 & 7 \\ 0 & 2 & -2 & -10 \\ 0 & -2 & 0 & 4 \end{array} \right) = \left(\begin{array}{ccc|c} 1 & -1 & 2 & 7 \\ 0 & 2 & -2 & -10 \\ 0 & 0 & -2 & -6 \end{array} \right)$$

Solve:

$$-2\chi_2 = -6 \Rightarrow \chi_2 = -6/-2 = 3$$

$$2\chi_1 - 2(3) = -10 \Rightarrow \chi_1 = (-10 + 6)/2 = -2$$

‹ Previous	Next ›

edX

edX

About
Affiliates
edX for Business
Open edX
Careers
News

Legal

Terms of Service & Honor Code
Privacy Policy
Accessibility Policy
Trademark Policy
Sitemap
Cookie Policy
Your Privacy Choices

Connect

Idea Hub
Contact Us
Help Center
Security
Media Kit

Calculator

深圳市恒宇博科技有限公司 粤ICP备17044299号-2

Calculator