

6.4 Exercises, page 369

1. (a) B is a 1×3 matrix and C is a 3×3 matrix. BC is possible because the number of columns in B is equal to the number of rows in C . CB is not possible because the number of columns in B is not equal to the number of rows in C .

(b) 1×1 matrix

(c) $10 \times 1 + 20 \times 2 + 30 \times 3 = [140]$

(d) $BC = [200 \ 400 \ 600]$

2. $XY: 5 \times 5$; $YX: 3 \times 3$

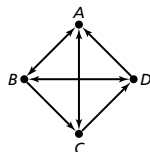
3. (a) $[140]$

(b) $\begin{bmatrix} 2 & 4 & 6 \\ 1 & 3 & 5 \end{bmatrix}$

4. (a) $\begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$

(b) $\begin{bmatrix} 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 \end{bmatrix}$

- 5.



6. (a) Both equal $\begin{bmatrix} -2 & -2 \\ 16 & 16 \end{bmatrix}$.

(b) $A \times B = \begin{bmatrix} -1 & -1 \\ 6 & 10 \end{bmatrix}$; $B \times A = \begin{bmatrix} 2 & 6 \\ 3 & 7 \end{bmatrix}$

(c) Both equal $\begin{bmatrix} -6 & -6 \\ -6 & -6 \end{bmatrix}$. (d) Both equal $\begin{bmatrix} 6 & 6 \\ 10 & 10 \end{bmatrix}$.

7. (a) Both equal $\begin{bmatrix} 4 & 4 & 4 \\ 8 & 8 & 8 \\ 8 & 8 & 8 \end{bmatrix}$.

(b) $A \times B = \begin{bmatrix} 3 & 1 & 0 \\ 3 & 2 & 3 \\ 1 & 5 & 2 \end{bmatrix}$; $B \times A = \begin{bmatrix} 0 & 2 & 4 \\ 1 & 4 & 3 \\ 3 & 0 & 3 \end{bmatrix}$

(c) Both equal $\begin{bmatrix} 0 & 0 & 0 \\ 2 & 2 & 2 \\ 2 & 2 & 2 \end{bmatrix}$. (d) Both equal $\begin{bmatrix} 4 & 4 & 4 \\ 6 & 6 & 6 \\ 6 & 6 & 6 \end{bmatrix}$.

8. Both equal $\begin{bmatrix} 6 & 0 \\ 3 & 0 \end{bmatrix}$.

9. Answers may vary. Both are equal if $A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} -1 & 0 \\ 0 & 1 \end{bmatrix}$.

10. Kiddie: \$9.58, Adult: \$14.17

11. Descartes: frame pieces: 50, glass sections: 14; Gauss: frame pieces: 70, glass sections: 20; Fermat: frame pieces: 94, glass sections: 28

12. Monday: \$81 875, Tuesday: \$89 625, Wednesday: \$95 750, Thursday: \$120 625, Friday: \$126 875, Saturday: \$116 000, Sunday: \$84 000

13. (a) A: \$23, B: \$44, C: \$86, D: \$107

(b) Descartes: \$310, Gauss: \$440, Fermat: \$608

14. (a) yes (b) yes (c) 3

15. (a) 3 (b) not possible

16. (a) cottage: \$2.68, white: \$3.23, buttermilk: \$2.24
(b) \$580

6.5 Exercises, page 379

1. (a) Turn on computer. Turn on monitor. Enter password. Turn on printer. Click on Shortcut. Click Print. Exit program. Turn off printer. Click Start. Click Shut Down. Turn off computer. Turn off monitor.

- (b) Get two slices of bread. Push down toaster switch. Get plate from cupboard. Get knife from drawer. Get peanut butter from shelf. Spread peanut butter on bread. Eat peanut butter on toast.

- (c) Drive to school. Park the car. Go to first class. Go to second class. Eat lunch. Go to third class. Go to fourth class. Go to after-school practice. Drive home

- (d) Turn on CD player. Turn on stereo receiver. Select CD. Press play. Adjust volume.

3. Sequential tasks are dependent on each other and must be performed in order. Parallel tasks are independent and may be performed simultaneously. Sequential examples: turn on car; drive. Wet hair; shampoo. Parallel examples: walk and talk. Drive and listen to the radio.

5. (i) (a) A: 0, B: 5, C: 10, D: 17, E: 36, F: 36, G: 43, H: 56, Finish: 63

- (b) A: 0, B: 3, D: 3, C: 9, E: 9, F: 21, G: 40, H: 40, J: 40, K: 57, Finish: 65

- (c) A: 0, B: 1, G: 2, C: 11, H: 6, D: 16, I: 14, K: 10, E: 19, J: 17, F: 25, End: 32

- (d) G: 0; A: 2; H: 4; B: 6; I: 6; C: 8; J: 12; D: 12; E: 20; End: 22

- (e) A: 0, B: 6, C: 12, F: 32, E: 23, D: 19, G: 33, I: 41, H: 35, End: 54

- (ii) (a) A-B-C-D-E-G-H

- (b) A-D-E-F-J-K

- (c) A-G-C-D-E-F

- (d) G-A-B-C-D-E

- (e) A-C-E-G-I or A-C-E-F-G-I

- (iii) (a) 63 d

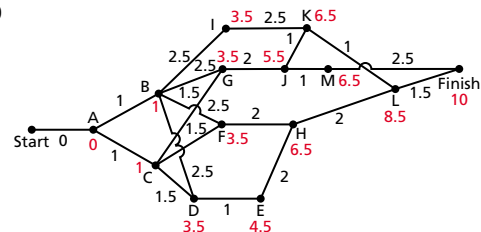
- (b) 65 d

- (c) 32 d

- (d) 22 d

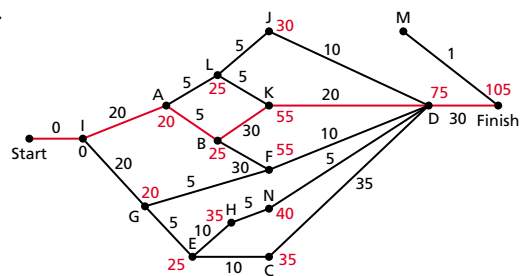
- (e) 54 d

6. (a)



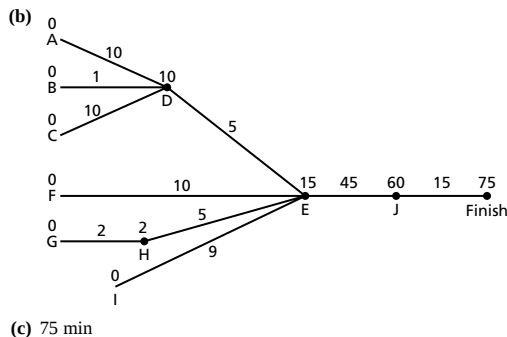
- (b) 10 months

- 7.



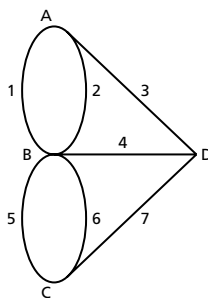
Critical Path: I-A-B-K-D; 105 min

9. (a)	Duration (min)	Prerequisite(s)
A. Fry beef	10	—
B. Chop $\frac{1}{2}$ onion	1	—
C. Chop 1 green pepper	2	—
D. Add oil, onion, garlic, sauce, corn, green pepper, sugar, salt, chili	5	A, B, C
E. Bake in oven	45	D, F, H, I
F. Combine cornmeal and milk	10	—
G. Mix flour, salt, baking powder, sugar	2	—
H. Add vegetable shortening, egg, milk	5	G
I. Preheat oven to 375°	9	—
J. Cool dish	15	E



Chapter 6 Wrap-Up, page 385

3. Not possible to cross each bridge just once.



4. (a) $A: 1 \times 3, B: 3 \times 1, C: 3 \times 3$

(b) $\begin{bmatrix} 2 & 2 & 4 \\ 4 & 6 & 1 \\ 1 & 1 & 4 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 2 & 4 \\ 4 & 4 & 1 \\ -1 & 1 & 2 \end{bmatrix}$ (d) $\begin{bmatrix} 2 & 4 & 8 \\ 8 & 10 & 2 \\ 0 & 2 & 6 \end{bmatrix}$

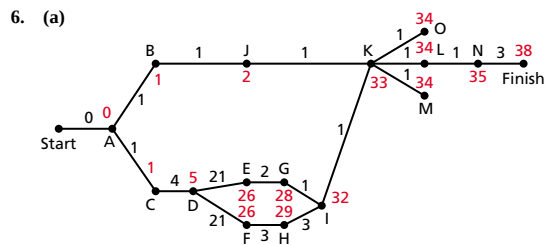
(e) $\begin{bmatrix} 3 \\ -6 \\ -30 \end{bmatrix}$ (f) $[9 \ 17 \ 21]$

(g) $B \times C$ does not exist. $C \times B = \begin{bmatrix} 43 \\ 16 \\ 32 \end{bmatrix}$

- (h) When two matrices $m \times n$ and $k \times j$ are multiplied, we must have that $n = k$ (inner dimensions match). For $A \times C$, $3 = 3$, so this is okay. For $C \times A$, $3 \neq 1$, so this is NOT okay.

- (i) Both equal $[15 \ 19 \ 26]$.

5. 1-3-5-8-10-11; earliest completion time: 36 d



- (b) A-C-D-F-H-I-J-K-L-N (c) 38 d

Chapter 6 Test, page 387

2. (a) $A: 1 \times 3, B: 3 \times 1, C: 3 \times 3$

(b) $\begin{bmatrix} 4 & 2 & 4 \\ 7 & 1 & 1 \\ 6 & 1 & 7 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 2 & 4 \\ 1 & -1 & 1 \\ 4 & 1 & -1 \end{bmatrix}$ (d) $\begin{bmatrix} 4 & 4 & 8 \\ 8 & 0 & 2 \\ 10 & 2 & 6 \end{bmatrix}$

(e) $\begin{bmatrix} 6 \\ -9 \\ 21 \end{bmatrix}$ (f) $[17 \ -3 \ -1]$

(g) $B \times C$ does not exist. $C \times B = \begin{bmatrix} -26 \\ -15 \\ -28 \end{bmatrix}$

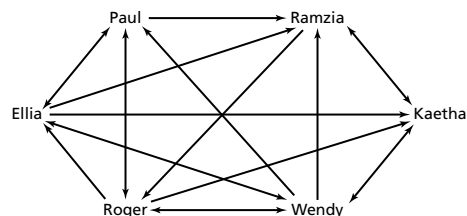
- (h) Inside dimensions must be the same to multiply two matrices.

For $A \times C$, $(1 \times 3) \times (3 \times 3)$ is okay.

For $C \times A$, $(3 \times 3) \times (1 \times 3)$ is NOT okay.

- (i) Both equal $[14 \ -3 \ 19]$.

3. (a)



(b) $\begin{bmatrix} 0 & 1 & 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 0 & 1 & 1 & 1 & 1 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 \end{bmatrix}^4; 15$

4. A-B-H-K-L-M-E-J-G: EST: 59 d

Task	Duration (d)	Prerequisite Task(s)
Start	0	
A	2	Start
B	5	A
C	7	B, H
D	4	C
E	12	D, I, M
F	4	E
G	7	F, J
H	7	B
I	10	H
J	5	E
K	7	H
L	9	K
M	5	H, L