

The Ch.4 (A2) Exam is identical in format to this review. Note that you may use a calculator for the entire exam EXCEPT #21-24.

#1-21: See multiple-choice packet.

#21-24 CALCULATORS ARE NOT PERMITTED IN THIS SECTION...DO ALL WORK BY HAND!!

$$A = \begin{bmatrix} 1 & 0 & -2 \\ 3 & 4 & 5 \end{bmatrix} \quad B = \begin{bmatrix} 1 & 2 \\ 0 & 3 \end{bmatrix} \quad C = \begin{bmatrix} 2 & -5 \\ 0 & 3 \\ 1 & -1 \end{bmatrix}$$

$$D = \begin{bmatrix} 3 & 4 \\ -2 & 1 \end{bmatrix} \quad E = \begin{bmatrix} -6 & 2 & 1 \\ 5 & -2 & 3 \end{bmatrix} \quad F = \begin{bmatrix} 8 & 0 & -5 \\ 4 & 1 & 2 \end{bmatrix}$$

Perform the indicated operations, if possible. If it is impossible, explain why.

21. $A + F - 3E$ (4 points)

22. B^{-1} (The inverse of matrix B.) (3 points)

23. BA (4 points)

24. CF (5 points)

#25-30: CALCULATORS ARE PERMITTED FOR THIS SECTION.

#25-26: Find the inverse of each matrix. If the inverse of the matrix does not exist, write *no inverse*. (2 points each)

21. $\begin{bmatrix} -3 & 2 \\ 9 & -6 \end{bmatrix}$

26. $\begin{bmatrix} -2 & 2 & -1 \\ 3 & -5 & 4 \\ 5 & -6 & 4 \end{bmatrix}$

27. The message below was encoded using matrix $A = \begin{bmatrix} 2 & 5 \\ 1 & 3 \end{bmatrix}$. Decode the message. Use the letter key provided to write the message in words. SHOW THE MATRIX THAT YOU ENTERED INTO YOUR CALCULATOR and what steps you had to use to solve via calculator. (4 points)

Message: 80, 41, 18, 43, 70, 113, 153, 25, 130, 44, 23, 9, 22, 42, 66, 88, 15, 74

28. Concert tickets are \$24 for adults, \$15 for children, and \$12 for senior citizens. The revenue from the concert was \$5670. Five times as many adults attended as senior citizens. Twice as many children attended as senior citizens. Set up and solve a system of equations to determine how many of each type of ticket were sold. Use matrices to solve the system. (8 points)

#29-30: Solve each system using elementary row operations. Show each step.

(HINT: Write as an augmented matrix. The perform elementary row operations until the LEFT part of the augmented matrix is I.)

29. $\begin{cases} 3x + 2y = 7 \\ -5x + 3y = 1 \end{cases}$ (3 points)

30. $\begin{cases} 5x + 2y - 2z = -12 \\ -7y + 5z = 5 \\ 5x + 4y - 2z = -12 \end{cases}$ (5 points)

Name _____

MULTIPLE CHOICE. Choose the one alternative that best completes the statement or answers the question.**Perform the indicated operation, if possible.**

1) $\begin{bmatrix} -1 & 1 \\ 2 & 5 \end{bmatrix} + \begin{bmatrix} 6 & 2 \\ 4 & 2 \end{bmatrix}$

1) _____

A) $\begin{bmatrix} 5 & 1 \\ 3 & 1 \end{bmatrix}$

B) $\begin{bmatrix} 3 & 4 \\ 3 & 7 \end{bmatrix}$

C) $\begin{bmatrix} 5 & 3 \\ 6 & 7 \end{bmatrix}$

D) $\begin{bmatrix} 21 \end{bmatrix}$

2) $\begin{bmatrix} 5 & 4 \end{bmatrix} + \begin{bmatrix} -1 \\ 8 \end{bmatrix}$

2) _____

A) $\begin{bmatrix} 5 & -1 \\ 4 & 8 \end{bmatrix}$

B) $\begin{bmatrix} 4 \\ 12 \end{bmatrix}$

C) Not defined

D) $\begin{bmatrix} 4 & 12 \end{bmatrix}$

3) $\begin{bmatrix} -1 & 3 \\ 0 & 4 \\ 9 & -4 \end{bmatrix} - \begin{bmatrix} 2 & 1 \\ 7 & 4 \\ 2 & 2 \end{bmatrix}$

3) _____

A) $\begin{bmatrix} 3 & -2 \\ 7 & 0 \\ -7 & 6 \end{bmatrix}$

B) $\begin{bmatrix} 1 & 4 \\ 7 & 8 \\ 11 & 0 \end{bmatrix}$

C) $\begin{bmatrix} 1 & 2 \\ 7 & 0 \\ 7 & -2 \end{bmatrix}$

D) $\begin{bmatrix} -3 & 2 \\ -7 & 0 \\ 7 & -6 \end{bmatrix}$

Find the matrix product, if possible.

4) $\begin{bmatrix} -2 & 3 \\ 4 & 2 \end{bmatrix} \begin{bmatrix} -2 & 0 \\ -1 & 3 \end{bmatrix}$

4) _____

A) $\begin{bmatrix} 4 & -6 \\ -6 & 3 \end{bmatrix}$

B) $\begin{bmatrix} 4 & 0 \\ -4 & 6 \end{bmatrix}$

C) $\begin{bmatrix} 9 & 1 \\ 6 & -10 \end{bmatrix}$

D) $\begin{bmatrix} 1 & 9 \\ -10 & 6 \end{bmatrix}$

5) $\begin{bmatrix} 6 & 8 & -2 \\ -1 & 8 & 5 \end{bmatrix} \begin{bmatrix} -7 & 5 & 2 \\ -6 & 4 & -1 \\ 9 & 3 & -5 \end{bmatrix}$

5) _____

A) $\begin{bmatrix} -42 & 40 & -4 \\ 6 & 32 & -5 \\ -9 & 24 & -25 \end{bmatrix}$

B) $\begin{bmatrix} 6 & 8 & -2 \\ -1 & 8 & 5 \\ -7 & 5 & 2 \\ -6 & 4 & -1 \\ 9 & 3 & -5 \end{bmatrix}$

C) $\begin{bmatrix} -108 & 56 & 14 \\ 4 & 42 & -35 \end{bmatrix}$

D) $\begin{bmatrix} -108 & 4 \\ 56 & 42 \\ 14 & -35 \end{bmatrix}$

$$6) \begin{bmatrix} -1 & 3 \\ 3 & 6 \end{bmatrix} \begin{bmatrix} 0 & -2 & 5 \\ 1 & -3 & 2 \end{bmatrix}$$

6) _____

A)

$$\begin{bmatrix} 3 & -7 & 1 \\ 6 & -24 & 27 \end{bmatrix}$$

B) Not possible

C)

$$\begin{bmatrix} 3 & 6 \\ -7 & -24 \\ 1 & 27 \end{bmatrix}$$

D)

$$\begin{bmatrix} 0 & -6 & 12 \\ 3 & -18 & 12 \end{bmatrix}$$

Determine the value of each variable.

7)

$$\begin{bmatrix} 2 & 8 & -6 \\ 1 & m & -2 \end{bmatrix} = \begin{bmatrix} x & y & -6 \\ 1 & -2 & -2 \end{bmatrix}$$

7) _____

A) $x = 2; y = 8; m = -2$

B) $x = 8; y = 2; m = -2$

C) $x = -2; y = -8; m = 2$

D) $x = -2; y = 8; m = 2$

8)

$$\begin{bmatrix} 1 & -8 & x \\ -3 & y & -7 \end{bmatrix} = \begin{bmatrix} m & -8 & 4 \\ n & 2 & p \end{bmatrix}$$

8) _____

A) $m = 1, x = 4, n = -3, y = 2, p = -7$

B) $m = 1, x = -8, n = -3, y = 2, p = -7$

C) $m = -3, x = -8, n = 1, y = 2, p = -7$

D) $m = 1, x = 4, n = -8, y = 2, p = -7$

Find the indicated matrix.

9) Let $A = \begin{bmatrix} 2 & 3 \\ 2 & 6 \end{bmatrix}$ and $B = \begin{bmatrix} 0 & 4 \\ -1 & 6 \end{bmatrix}$. Find $3A + B$.

9) _____

A)

$$\begin{bmatrix} 6 & 13 \\ 1 & 12 \end{bmatrix}$$

B)

$$\begin{bmatrix} 6 & 13 \\ 5 & 24 \end{bmatrix}$$

C)

$$\begin{bmatrix} 6 & 21 \\ 3 & 36 \end{bmatrix}$$

D)

$$\begin{bmatrix} 6 & 7 \\ 5 & 12 \end{bmatrix}$$

10) Let $A = \begin{bmatrix} -3 & 2 \\ 0 & 2 \end{bmatrix}$. Find $4A$.

10) _____

A)

$$\begin{bmatrix} 1 & 6 \\ 4 & 6 \end{bmatrix}$$

B)

$$\begin{bmatrix} -12 & 8 \\ 0 & 2 \end{bmatrix}$$

C)

$$\begin{bmatrix} -12 & 8 \\ 0 & 8 \end{bmatrix}$$

D)

$$\begin{bmatrix} -12 & 2 \\ 0 & 2 \end{bmatrix}$$

Find the inverse of A if it has one, or state that the inverse does not exist.

$$11) A = \begin{bmatrix} -2 & 0 & 2 \\ -8 & -1 & 6 \\ -3 & -1 & 1 \end{bmatrix}$$

11) _____

A)

$$\begin{bmatrix} -\frac{1}{2} & 0 & 0 \\ 0 & -1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$$

B) Inverse does not exist

C)

$$\begin{bmatrix} -\frac{1}{2} & 0 & 1 \\ 0 & -1 & 0 \\ 1 & 0 & 1 \end{bmatrix}$$

D)

$$\begin{bmatrix} -\frac{1}{2} & 0 & \frac{1}{2} \\ -\frac{1}{8} & -1 & \frac{1}{6} \\ -\frac{1}{3} & -1 & 1 \end{bmatrix}$$

$$12) A = \begin{bmatrix} 1 & 0 & 8 \\ 1 & 2 & 3 \\ 2 & 5 & 3 \end{bmatrix}$$

12) _____

A) Inverse does not exist

B)

$$\begin{bmatrix} 9 & -40 & 16 \\ -3 & 13 & -5 \\ -1 & 5 & -2 \end{bmatrix}$$

C)

$$\begin{bmatrix} 1 & 1 & 2 \\ 0 & 2 & 5 \\ 8 & 3 & 3 \end{bmatrix}$$

D)

$$\begin{bmatrix} -1 & 0 & -8 \\ -1 & -2 & -3 \\ -2 & -5 & -3 \end{bmatrix}$$

$$13) A = \begin{bmatrix} 3 & 3 \\ 8 & 8 \end{bmatrix}$$

13) _____

A) Inverse does not exist

B)

$$\begin{bmatrix} \frac{1}{3} & 0 \\ 0 & \frac{1}{8} \end{bmatrix}$$

C)

$$\begin{bmatrix} 8 & -3 \\ -11 & 4 \end{bmatrix}$$

D)

$$\begin{bmatrix} 8 & -3 \\ -8 & 3 \end{bmatrix}$$

14) $A = \begin{bmatrix} 0 & -4 \\ -1 & 3 \end{bmatrix}$

14) _____

A) $\begin{bmatrix} -\frac{3}{4} & -1 \\ -\frac{1}{4} & 0 \end{bmatrix}$

B) $\begin{bmatrix} -\frac{3}{4} & 1 \\ \frac{1}{4} & 0 \end{bmatrix}$

C) $\begin{bmatrix} 0 & -1 \\ -\frac{1}{4} & -\frac{3}{4} \end{bmatrix}$

D) Inverse does not exist

Find the determinant of the given matrix.

15) $\begin{bmatrix} -2 & 3 & 3 \\ 5 & 4 & 5 \\ 2 & 2 & -2 \end{bmatrix}$
A) -102

B) 42

C) 50

D) 102

15) _____

16) $\begin{bmatrix} 6 & 6 & 7 & 4 \\ 5 & 6 & 1 & 8 \\ 8 & 6 & 1 & 9 \\ 4 & 2 & 2 & 6 \end{bmatrix}$
A) 59

B) -406

C) 52

D) 34

16) _____

Find a matrix A and a column matrix B that describe the following tables involving credits and tuition costs. Find the matrix product AB, and interpret the significance of the entries of this product.

17)

17) _____

Credits	College A	College B	Cost	Tuition
Student 1	9	8	College A	\$60
Student 2	3	12	College B	\$50
Student 3	6	6		

A)

$$AB = \begin{bmatrix} 12 \\ 17 \\ 15 \end{bmatrix}$$

The number of credits for Student 1 is 12, the number of credits for Student 2 is 17, and the number of credits for Student 3 is 15.

B)

$$AB = \begin{bmatrix} 840 \\ 630 \\ 910 \end{bmatrix}$$

Tuition for Student 1 is \$840, tuition for Student 2 is \$630, and tuition for Student 3 is \$910.

C)

$$AB = \begin{bmatrix} 940 \\ 780 \\ 660 \end{bmatrix}$$

Tuition for Student 1 is \$940, tuition for Student 2 is \$780, and tuition for Student 3 is \$660.

D)

$$AB = \begin{bmatrix} 17 \\ 15 \\ 12 \end{bmatrix}$$

The number of credits for Student 1 is 17, the number of credits for Student 2 is 15, and the number of credits for Student 3 is 12.

Solve the problem.

18) The sum of three numbers is 2. The first, minus the second, plus 4 times the third, is -12. The third, plus 4 times the first, plus the second, is 17. What are the numbers? 18) _____

- A) (5, 5, 1) B) (5, 1, -4) C) No solution D) (-5, -1, 4)

19) Michael's bank contains only nickels, dimes, and quarters. There are 47 coins in all, valued at \$4.00. The number of nickels is 1 short of being three times the sum of the number of dimes and quarters together. How many dimes are in the bank? 19) _____

- A) 5 B) 35 C) 7 D) 10

20) A grain dealer sold to one customer 4 bushels of wheat, 3 of corn, and 4 of rye, for \$29.50; to another, 3 of wheat, 4 of corn, and 4 of rye, for \$31.50; and to a third, 4 of wheat, 4 of corn, and 3 of rye, for \$29.20. What was the price per bushel for corn? 20) _____

- A) \$1.80 B) \$1.30 C) \$3.30 D) \$3.60

Answer Key

Testname: HA2PC_CH4(A2)_REVIEW

- 1) C
- 2) C
- 3) D
- 4) D
- 5) C
- 6) A
- 7) A
- 8) A
- 9) B
- 10) C
- 11) B
- 12) B
- 13) A
- 14) A
- 15) D
- 16) B
- 17) C
- 18) B
- 19) A
- 20) C