MAC1140 FINAL REVIEW C 11-30-2007 10.1-11.5

Mr. Fei Hua (fhua@math.fsu.edu)

Due: 12-05-2007

Full Name: Sec#:

1.

[10.2.1PT]Select the type of solution for the following system

$$\begin{cases} 2x - 3y + z = 0 \\ 2x + 4y - 3z = 0 \\ 6x - 2y - z = 0 \end{cases}$$

- ○ None of these
- ○ Infinitely many solutions
- ○ No solution
- ○ Unique solution
- ○ Exactly three solutions

2.

[10.3.1aPT]Choose the echelon form of the following matrix

$$\begin{bmatrix} 3 & -4 & -2 \\ -9 & 12 & -6 \end{bmatrix}$$

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

3.

[10.3.1bPT]Choose the reduced row echelon form of the following matrix

$$\begin{bmatrix} 1 & -1 & 1 & -4 \\ 2 & -3 & 4 & -15 \\ 5 & 1 & -2 & 12 \end{bmatrix}$$

- ○ $\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & -2 & 7 \\ 0 & 0 & 1 & -2 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & -1 & -3 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -2 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & 0 & 1 \\ 0 & 1 & 0 & 3 \\ 0 & 0 & 1 & -2 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & -1 & 3 \\ 0 & 1 & -2 & 7 \\ 0 & 0 & 0 & 0 \end{bmatrix}$

4.

[10.3.2PT]Choose the type of solution for the linear system having the following augmented matrix

$$\left[\begin{array}{ccc|c} 1 & -4 & 0 & \frac{3}{2} \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{array}\right]$$

- ○ No solution
- ○ Exactly two solutions
- ○ Infinitely many solutions
- ○ None of these
- ○ Unique solution

5.

[10.3.3aPT]Select the matrix which is in reduced row echelon form

- ○ $\begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 \\ 0 & 0 & 1 & 1 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & 0 & 2 \\ 1 & 0 & 0 & 1 \\ 0 & 0 & 0 & -1 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & -5 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
- ○ $\begin{bmatrix} 1 & 0 & 1 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix}$
- ○ None of these

6.

[10.3.4aPT]Choose the correct x, y, or z value for the solution of the system

$$\begin{cases} x + 5y - 11z = 6 \\ 3x + 9y - 22z = 11 \\ 2x + 4y - 10z = 6 \end{cases}$$

- ○ $z = -1$
- ○ $x = -8$
- ○ $z = -2$
- ○ $y = 3$
- ○ $y = 1$

7.

[10.4.1aPT] $\begin{vmatrix} 2 & -1 & 4 \\ -1 & 3 & -2 \\ -z & x & 2y \end{vmatrix} =$

- ○ $-10y - 10z$
- ○ $y + z$
- ○ $10y + 10z - 8x$

○ $10y + 10z$

8. (Letters to denote the determinants may be changed in the real Final Exam.)

[10.4.2aPT]Select the solution given by Cramer's rule for the following system, where

$$D = \begin{vmatrix} 2 & -3 & -4 \\ 1 & -2 & 2 \\ 2 & 7 & -1 \end{vmatrix} \; A = \begin{vmatrix} 2 & -3 & -4 \\ -1 & -2 & 2 \\ 2 & 7 & -1 \end{vmatrix} \; B = \begin{vmatrix} 2 & 2 & -4 \\ 1 & -1 & 2 \\ 2 & 2 & -1 \end{vmatrix} \; C = \begin{vmatrix} 2 & -3 & 2 \\ 1 & -2 & -1 \\ 2 & 7 & 2 \end{vmatrix}$$

$$\begin{cases} 2x - 3y - 4z = 2 \\ x - 2y + 2z = -1 \\ 2x + 7y - z = 2 \end{cases}$$

None of these

○ $y = C/D$

○ $y = D/C$

○ $y = D/B$

○ $y = B/D$

9.

[10.5.1aPT]Find $CE - 2D$ if

$$C = \begin{pmatrix} -1 & 2 \\ 4 & -3 \\ 0 & -2 \end{pmatrix} \; D = \begin{pmatrix} -1 & 3 \\ 0 & -2 \\ -3 & 4 \end{pmatrix} \; E = \begin{pmatrix} -2 & 6 \\ 4 & 2 \end{pmatrix}$$

○ $\begin{pmatrix} 8 & 4 \\ -20 & 14 \\ -14 & 4 \end{pmatrix}$

○ can not be done

○ $\begin{pmatrix} 12 & -8 \\ -20 & 22 \\ -2 & -12 \end{pmatrix}$

○ $\begin{pmatrix} 8 & -8 \\ -20 & 14 \\ -14 & 4 \end{pmatrix}$

10.

[10.5.1bPT]Find the matrix product ABC if

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

○ $\begin{pmatrix} -1 & 2 \\ -4 & 3 \end{pmatrix}$

○ $\begin{pmatrix} -6 & -3 \\ -4 & 3 \end{pmatrix}$

○ $\begin{pmatrix} 0 & -5 \\ -4 & 3 \end{pmatrix}$

○ $\begin{pmatrix} -3 & -4 \\ -6 & -3 \end{pmatrix}$

11.

[10.5.2aPT]Select the first row of the inverse matrix for

$\begin{pmatrix} 2 & 1 & 4 \\ 3 & 2 & 5 \\ 0 & -1 & 1 \end{pmatrix}$

○ (5 -3 3)

○ (-7 5 3)

○ (-7 5 -3)

○ (-4 3 3)

12.

[10.5.2bPT]Select the third column of the inverse matrix for

$$\begin{pmatrix} -5 & -2 & -2 \\ 2 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix}$$

- ○ $\begin{pmatrix} -2 \\ 4 \\ -1 \end{pmatrix}$
- ○ $\begin{pmatrix} 3 \\ -4 \\ -2 \end{pmatrix}$
- ○ $\begin{pmatrix} -2 \\ -4 \\ 3 \end{pmatrix}$
- ○ $\begin{pmatrix} 2 \\ -4 \\ -1 \end{pmatrix}$

13.

[10.5.2cPT]Select the entry in the second row and second column of the inverse matrix for

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

- ○ 2
- ○ -5
- ○ 1
- ○ 3

14.

[10.5.2ePT]Find y in the solution of the system

$$\begin{cases} a_1x + b_1y + c_1z = \frac{1}{4} \\ a_2x + b_2y + c_2z = -2 \\ a_3x + b_3y + c_3z = -1 \end{cases}$$

if the inverse of the coefficient matrix $\begin{bmatrix} a_1 & b_1 & c_1 \\ a_2 & b_2 & c_2 \\ a_3 & b_3 & c_3 \end{bmatrix}$ is $\begin{bmatrix} -2 & 1 & -\frac{1}{2} \\ -1 & -1 & \frac{1}{4} \\ 2 & -\frac{1}{4} & -1 \end{bmatrix}$

- $\frac{5}{2}$
- $-\frac{1}{2}$
- $\frac{3}{2}$
- 2
- $\frac{3}{8}$
- -2

15.

[11.1.1aPT]The first four terms of the sequence $\{(-1)^{2n}\frac{2n-1}{n+1}\}$ are

- $-\frac{7}{5}, \frac{5}{4}, -1, \frac{1}{2}$
- $\frac{1}{2}, \frac{4}{3}, \frac{5}{4}, \frac{7}{5}$
- $\frac{1}{2}, 1, \frac{5}{4}, \frac{7}{5}$
- $\frac{1}{2}, -1, -\frac{5}{4}, \frac{7}{5}$

16.

[11.1.1bPT]The first four terms of the recursive sequence given by $a_1 = 2, a_n = -\frac{n}{a_{n-1}}$ are

- None of these
- $2, -\frac{1}{2}, 6, -\frac{2}{3}$
- $2, -1, 3, -12$
- $2, -1, 3, -\frac{4}{3}$

17.

[11.1.1cPT] The n^{th} term of the sequence $1, \frac{5}{4}, \frac{7}{5}, \frac{3}{2}, \cdots$ is

- $\frac{2n+1}{3n}$
- $\frac{2n+1}{n+2}$
- $\frac{2n-1}{3n-1}$

○ $\frac{2n-1}{3n}$

18.

[11.1.2aPT] $\sum_{k=1}^{4}(-1)^k 3^k =$

○ 78
○ 59
○ 120
○ 60

19.

[11.1.2bPT] Select the summation notation for $-\frac{1}{e}+\frac{2}{e^2}-\frac{3}{e^3}+\frac{4}{e^4}-\cdots-\frac{9}{e^9}$

☐ $\sum_{k=1}^{9}\frac{(-1)^k k}{e^k}$

☐ None of these

☐ $\sum_{k=1}^{9}\frac{(-1)^{k+1}(k+1)}{e^{k+1}}$

☐ $\sum_{k=1}^{8}\frac{(-1)^k (k+1)}{e^{k+1}}$

☐ $\sum_{k=0}^{9}\frac{(-1)^k k}{e^k}$

20.

[11.2.1aPT] The 6^{th} term of an arithmetic sequence with first term $a_1 = \sqrt{2}$ and common difference $d = -\sqrt{2}$ is

○ $-4\sqrt{2}$
○ None of these
○ $-5\sqrt{2}$
○ $-3\sqrt{2}$
○ $-2\sqrt{2}$

21.

[11.2.1bPT] The n^{th} term of an arithmetic sequence with first term $a_1 = 2$ and common difference $d = -\frac{1}{3}$ is

○ $\frac{4}{3} - \frac{1}{3}n$

○ None of these

○ $\frac{13}{3} - \frac{1}{3}n$

○ $\frac{10}{3} - \frac{1}{3}n$

○ $\frac{7}{3} - \frac{1}{3}n$

22.

The 2351st term of the arithmetic sequence {1, -1/3, -5/3, … } is

○ $-\frac{9403}{3}$

○ $-\frac{9397}{3}$

○ $-\frac{9400}{3}$

○ $\frac{9403}{3}$

○ $-\frac{9401}{3}$

23.

[11.2.2aPT]Given an arithmetic sequence with $a_{21} = 65$, and $a_{46} = 140$, find the first term a_1.

○ 4

○ 5

○ 2

○ 3

24.

[11.2.2cPT]Given the arithmetic sequence $\{1, \frac{1}{2}, 0, -\frac{1}{2}, \cdots\}$, find the sum S_{49}

○ -450

○ -369

○ -296

○ -539

25.

[11.3.1aPT]The 4^{th} term of a geometric sequence with first term $a_1 = \sqrt{2}$ and common ratio $r = -\sqrt{2}$ is

○ 8

○ 4
○ -4
○ $-4\sqrt{2}$

26.

[11.3.1bPT]The n^{th} term of a geometric sequence with first term $a_1 = 3$ and common ratio $r = -\frac{1}{3}$ is

None of these
○ $(-1)^{n-1}$
○ -9^{n-1}
○ $-\frac{1}{3}(3)^{n-1}$
○ 9^{n-1}
○ $3(-\frac{1}{3})^{n-1}$

27.

[11.3.2aPT]If a geometric sequence has $a_{17} = 15$ and $a_{18} = 13$, what is the common ratio?

○ $\frac{13}{15}$
○ None of these
○ $\frac{17}{18}$
○ $\frac{15}{13}$
○ $\frac{18}{17}$

28.

[11.3.3bPT]Find the sum of the infinite geometric series $\frac{1}{16} + \frac{1}{64} + \cdots + \frac{1}{4^{n+1}} + \cdots$

○ $\frac{1}{12}$
○ $\frac{1}{10}$
○ $\frac{1}{4}$

○ $\frac{1}{3}$

29.

[11.3.3cPT]Find the sum of the alternating infinite geometric series $\frac{5}{6} - \frac{25}{36} + \cdots + (-1)^{n+1}(\frac{5}{6})^n + \cdots$

○ $\frac{3}{7}$

○ $\frac{4}{9}$

○ $\frac{5}{11}$

○ $\frac{2}{5}$

30.

[11.3.3dPT]If the repeating decimal $0.261261261\cdots$ is written as $\frac{m}{n}$ in reduced form where m and n are integers, then $m =$

○ 5
○ 261
○ 7
○ 29

31.

[11.3.3ePT]If the repeating decimal $2.303030\cdots$ is written as $\frac{m}{n}$ in reduced form where m and n are integers, then $m =$

○ 12
○ 30
○ 10
○ 76

32.

[11.4.1aPT]Find a_2 and a_3 such that $-4 + a_2 + a_3 + \cdots + a_n = \frac{n(n-9)}{2}$ for all n.

○ $a_2 = -3, a_3 = -2$

○ $a_2 = -7, a_3 = -10$

○ $a_2 = -7, a_3 = -9$

○ None of these

33.

[11.4.2aPT]To prove by induction that $11+7+3+\cdots+(15-4n)=13n-2n^2$ is true for all positive integers n, we assume $11+7+3+\cdots+(15-4k)=13k-2k^2$ is true for some positive integer k, and show that $11+7+3+\cdots+(15-4k)+A=13(k+1)-2(k+1)^2$ where A is

- $19-4k$
- $14-4k$
- $11-4k$
- None of these
- $16-4k$

34.

[11.4.2bPT]To prove by induction that $6+4+2+\cdots+(8-2n)=7n-n^2$ is true for all positive integers n, we assume $6+4+2+\cdots+(8-2k)=7k-k^2$ is true for some positive integer k, and show that $6+4+2+\cdots+(8-2k)+(8-2(k+1))=A$ where A is

- $(7k+1)-(k^2+1)$
- $7(k+1)-(k^2+1)$
- $7(k+1)-(k+1)^2+1$
- $7(k+1)-(k+1)^2$
- $7k-k^2+1$

35.

[11.4.3aPT]To prove by induction that n^2-3n-2 is divisible by 2 is true for all positive integers n, we assume k^2-3k-2 is divisible by 2 is true for some positive integer k, and we show that A is divisible by 2, where A is

- $(k+1)^2-3(k+1)-2+1$
- None of these
- $(k+1)^2-3(k+1)-2$
- $(k^2+1)-(3k+1)-2$
- $k^2-3k-2+1$

36.

[11.4.3bPT]To prove by induction that n^2+7n-2 is divisible by 2 is true for all positive integers n, we assume k^2+7k-2 is divisible by 2 is true for some positive integer k and we show that $k^2+7k-2+A$ is divisible by 2, where A is

- $2(k+4)$
- $2(k-3)$
- $2(k+3)$
- $2(k+2)$
- None of these

37.

[11.5.1aPT]Find the coefficient of x^5 in the expansion of $(3-x)^8$

- $-\frac{8!}{5!}3^3$
- $\frac{8!}{5!3!}3^3$
- $\frac{8!}{3!}3^3$
- $\frac{11!}{5!6!}3^8$
- $-\frac{8!}{5!3!}3^3$

38.

[11.5.1aPT]Find the coefficient of x^6 in the expansion of $(x-2)^{10}$

- $\frac{10!}{6!4!}2^4$
- $\frac{10!}{6!}2^4$
- $-\frac{10!}{6!4!}2^4$
- $-\frac{10!}{4!}2^4$
- $-\frac{11!}{6!5!}2^{10}$

39.

[11.5.2aPT]Evaluate the binary coefficient $\binom{6}{0}$

- ○ 240
- ○ 6
- ○ 0
- ○ 30
- ○ 1

40.

[11.5.2aPT]Evaluate the binary coefficient $\binom{8}{2}$

- ○ 2
- ○ 28
- ○ 0
- ○ 1
- ○ 4