Dawson College
Mathematics Department
Final Examination
201-105-DW
Wednesday, December 22, 2010

Student Name: _____

Student I.D. #: _____

Teacher: _____

Instructors: L. Frajberg, G. Honnouvo, O. Zlotchevskaia

TIME: 14:00 – 17:00 (3 hours)

INSTRUCTIONS:

•

1. (6 marks) If $A = \begin{bmatrix} 1 & 3 & -2 \\ 2 & 4 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 3 & 2 \\ 1 & -1 \\ 1 & 3 \end{bmatrix}$,

find   i) $3A - 2B^T$.
        ii) $2AB$.

2. (4 marks) If $\left(2A^T\right)^{-1} = \begin{bmatrix} 4 & 1 \\ 7 & 3 \end{bmatrix}$, find A.

3. (5 marks) Find the general solution of the following system using Gauss or Gauss Jordan method.

$$
\begin{aligned}
x_1 &+2x_2 &-2x_3 &= 3 \\
2x_1 &-5x_2 &+4x_3 &= 6 \\
-x_1 &+16x_2 &-14x_3 &= -3
\end{aligned}
$$

4.   (7 marks)

ii)   Use your answer from i) to solve

$$x_1 - 2x_2 + 2x_3 = -3$$
$$2x_1 \quad 3x_2 \quad 4x_3 \quad 5$$
$$x_1 \quad x_2 \quad 4x_3 \quad 6$$

5. (4 marks) If $A^2 - 3A + 2I = 0$, find A^{-1}

6. (10 marks)

    i)   Suppose A is a 3x3 matrix such that $\det\left(2A^{-1}\right) = 3,$ *find* $\det A$.

ii)   If A is a 3x3 matrix $find \det\left(3A^T A^2\right)$ given that $\det A = 2$.

iii)   If $\det A = 2$, what is $\det\left(A^{-1} + 3adj\, A\right)$? Assume A is 2x2.

7.

8.

9. (4 marks) Consider $\begin{array}{l}(k-2)x+4y=0\\x+(k+1)y=0\end{array}$ For which values of k will the system have non-trivial (non-zero) solutions?

11. (5 marks) If $A(1,-2,1)$, $B(3,1,4)$, $C(4,1,-1)$ are the vertices of a triangle, find the area

13. (4 marks) Find the parametric equations of the line which passes through $P(1,-1,2)$ and is perpendicular to the plane whose equation is $-4x+3y+z+-10=0$.

14. (4 marks) Find the equation of the plane through $P(4,-2,1)$ which is parallel to <u>both</u> $\vec{u}=[2,1,3]$ and $\vec{v}=[1,-2,0]$.

18. (8 marks) Minimize $z = 4x_1 + 3x_2$ subject to the constraints

$$2x_1 + 3x_2 \geq 8$$

$$2x_1 + x_2 \geq 14$$

$$(x_1 \geq 0, \ x_2 \geq 0)$$