King Fahd University of Petroleum and Minerals
Department of Mathematics and Statistics

MATH 260 - Exam II - Term 151

Duration: 120 minutes

Name:_____ ID Number:_____

Section Number:_____ Serial Number:_____

Class Time: _____ Instructor's Name:_____

Instructions:

1. Calculators and Mobile Phones are not allowed.
2. Write legibly.
3. Show all your work. No points for answers without justification.
4. Make sure that you have 6 pages of problems (Total of 6 Problems)

Question Number	Points	Maximum Points
1		14
2		22
3		16
4		24
5		12
6		12
Total		100

1. **(14 points)** Use elementary row operations to find the inverse of $A = \begin{pmatrix} 3 & -8 & 0 \\ -1 & 3 & 0 \\ 0 & 0 & 1 \end{pmatrix}$.

2. (a) **(12 points)** Evaluate the determinant given by $\begin{vmatrix} 2 & -4 & 3 \\ 3 & 1 & 2 \\ 1 & 4 & -1 \end{vmatrix}$.

(b) **(10 points)** Use Cramer's rule to solve the system,

$$3x + 4y = -8$$

$$2x + 3y = -7$$

3. **(16 points)** For each of the given subsets of $\mathbb{R}^3$, determine whether it is a subspace of $\mathbb{R}^3$ or not. **Justify your answer**.

   (a) $S = \{(x, y, z) | x + 2y + z = 2\}$

   (b) $S = \{(x, y, z) | x + y = 3z\}$

4. **(12 points)** (a) Determine whether the vectors $\underline{u} = (1, 0, -2)$, $\underline{v} = (3, 2, -4)$ and $\underline{w} = (-3, 5, 1)$ are linearly independent or not?

(b) **(12 points)** Do the vectors $\underline{u}, \underline{v}$ and $\underline{w}$ in part(a) span $\mathbb{R}^3$?
Justify your answer.

5. **(12 points)** Express $\underline{t} = (1, -2, 1)$ as a linear combination of $\underline{u} = (1, 2, -1)$, $\underline{v} = (-3, 2, -1)$ and $\underline{w} = (2, 0, 0)$.

6. **(12 points)** Find a basis for the solution space of the given homogeneous system. Determine dimension of this solution space.

$$\begin{aligned} x_1 - 2x_2 \qquad - x_4 + 3x_5 &= 0, \\ x_1 - 2x_2 + x_3 + x_4 + x_5 &= 0, \\ x_3 + 2x_4 - 2x_5 &= 0. \end{aligned}$$