# MATH 221, FIRST EXAM, SUMMER 008

## AYMAN BADAWI

**QUESTION 1. 20 points** *a)For what values of $a, b$ will the the following system be consistent?*

$x_1 + x_2 + 8x_4 = a$
$-2x_1 - 2x_2 + bx_4 = 20$
$-x_1 - x_2 + x_3 - 6x_4 = 12$

*b) If I told you that the system above is consistent and it has 3 leading variables, then what is the free variable? what are the possibilities for the values of b.*

*c) For what values of $a, b$ will the above system be inconsistent?*

---

*Date*: June 18, 008.

**QUESTION 2. 10 points** *solve the following system. If the system has infinitely many solutions, then give me two particular solutions:*

$x_1 + x_2 - x_3 + x_4 = 12$

$2x_1 + 3x_2 - x_3 + 2x_4 = 20$

$3x_1 + 3x_2 - 3x_3 + 4x_4 = 30$

**QUESTION 3. 10 points**  *Let* $A = \begin{bmatrix} 1 & 0 & 2 \\ -2 & 1 & 3 \end{bmatrix}$ *and* $B = \begin{bmatrix} 1 & 1 \\ 0 & -3 \\ -2 & 1 \end{bmatrix}$ *Find*

*AB.*

**QUESTION 4. 10 points**  *Given* $H = \{(2x_2 + 5x_3, x_2, x_3) \mid x_2, x_3 \in R\}$ *is a subspace of* $R^3$ *(Do not show that). Rewrite* $H$ *as a SPAN. Find a Basis for* $H$. *What is the dimension of* $H$?

**QUESTION 5.** *a)* **10 points** *Is $D = \{(x_1, x_1 x_3, x_3) \mid x_1, x_3 \in R\}$ a subspace of $R^3$? Explain. If yes, then find a basis for D.*

**QUESTION 6.** *b)* **20 points** *Show that $F = \{(3x_2 + x_3, x_2, x_3) \mid x_2, x_3 \in R\}$ is a subspace of $R^3$. Find dim(F).*

**QUESTION 7.** *c)* **10 points** *Are $(1, 1, 2), (-1, 1, -1), (-2, -2, 5)$ independent? Explain*

Department of Mathematics & Statistics, American University Of Sharjah, P.O. Box 26666, Sharjah, United Arab Emirates, www.ayman-badawi.com

*E-mail address*: abadawi@aus.edu