MATH 484 - Exam #2 (sample) Section .... Name: ....

Date: Oct 26 2011   Start time 11:00 End time: 11:50

Work on your own. Write clearly. Ask if something is not clear. If you need more paper, let me know. Good luck!

Question 1:

Write definitions of the following terms :

- generalized inverz

- H-norm

- underdetermined system

Question 2:
State theorems which give answers to the following questions: *(without proofs)*

- Is there a correspondence between range of a matrix and some subspace?

- How solutions to an underderetmined system look like?

- State Support Theorem

Question 3:

Compute the equation of the linear regression line corresponding to the data on the table below:

x	-2	-1	0	1	2	3
y	12	11	8	5	2	-3

Question 4:

Find orthonormal base of linear subspace generated by

$L = \{(0, 3, 4, 0)^T, (0, 0, 5, 0)^T, (2, 1, 0, 2)^T\}$

Question 5:

Find the minimum norm solution of the underdetermined linear system

$$2x_1 + x_2 + x_3 + 5x_4 = 8$$
$$-x_1 - x_2 + 3x_3 + 2x_4 = 0$$

Question 6:

Find vector $\mathbf{x} \in \mathbb{R}^3$ that is closest to $(1, 1, 1)$ where $\alpha, \beta \in \mathbb{R}$ and

$$\mathbf{x} = \alpha(1, 1, 2) + \beta(2, -1, 1)$$

Question 7:

Minimize $f(x, y, z) = 2x^2 + 2xy + 2y^2 + z^2$

subject to $x - y + z = 3$

$9x + 6y + 2z = 5$

Question 8: D14 only *(D13 may try too if they wish)*

State and prove basic separation theorem.