THE UNIVERSITY OF CHICAGO

Master of Science in Analytics

MSCA 37016 – Advanced Linear Algebra for Machine Learning

Instructions:

- Mark the question number and your final answer clearly (use a textbox.)
- Remember to show and explain your work (*If you can't explain it, you don't understand it.*)
- Please submit your solution through Canvas.

(6 points) Question 1:

1) 5% - Solve $A\hat{x} = b$ by least squares (i.e., calculate $\hat{x}$).

$$A = \begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix};\ b = \begin{bmatrix} -1 \\ 1 \\ 0 \end{bmatrix}$$

2) 1% - Verify your answer using Python.

(2 point) Question 2:

$$T(x, y, z) = (z * x + 1, z, y)$$

1) 2% - Is this a linear transformation? Explain your answer.

(7 points) Question 3:

Suppose T is the linear transformation from R^2 to R^2

$$T(x, y) = (2x, 3y)$$

1) 2% - Find the matrix representation of the given linear transformation based on the standard basis.
2) 1% - Is T invertible? Explain your answer.
3) 2% - Find the Kernel of T
4) 2% - Find the Range of T

The University of Chicago, MSc Analytics Program
455 N Cityfront Plaza, Suite 950
Chicago, IL 60611
analytics@uchicago.edu