2

1. Consider the following system of linear equations:

 ͻ൅͵൅ൌͲ
 ͵൅ʹ൅ൌͶ
 ͸൅ʹ൅ൌͳ

a) Solve this system using the inverse of its coefficient matrix.
b) Use Gauss-Jordan elimination to solve the homogeneous system whose
coefficient matrix is the augmented matrix of the given system.
c) Solve the system whose coefficient matrix is the augmented matrix of the given
system and which has a particular solution ሺͳǡെͳǡെͳǡͳሻǤ

2. Consider the following system:

 ͳൌݖ݇ ൅ ݕ ൅ ݔ݇
 ͳൌݖ ൅ ݕ ൅ ݔ
 ሺʹെ݇ሻݔ ൅ ሺʹെ݇ሻݕ ൅ ݖ ൌͳ
݇ ൌݖ݇ ൅ ݕ ൅ ݔ݇
ଶ

For what values of k
For what valuesG

For what values

a)
ͳ

r�s
ଶ

Jo381</MC[(a))] TJ
ET
Qq
0.00000912 0 96
892302 792 n
BT
/F2 12 Tf
1 0 0 1 81.144 511.03 Tm

r
E t

3

5. Given the points ܣሺെ͵ǡͲǡെͳሻܤሺെʹǡͳǡͲሻǤ
a) Find the point C on the YZ-plane (i.e. the plane spanned by ࢐࢑ (such the points A, B
and C are collinear .
b) Find the distance between the origin and the line passing through the points A and B.
c) Determine whether the points A and B are on the same side of the plane ͹ݔ ൅ ݕ ൅ ݖ ൌͳǤ

6. a) If ࢛ ൌሺͲǡͳǡͳሻܽ݊݀࢜ ൌሺ݌ǡͶǡ݌ሻ then find the parameter ݌ such that the angle between
 is ࢜࢛ vectors
గ
ଷ
 .
 b) Show that if ࢛࢜ are vectors in Թଷ
 such that ࢛ ൅ ࢜࢛ െ࢜ have the same length
 then ࢛࢜ are orthogonal.

 c) If ࢛ǡ࢜࢝ are vectors in Թଷ
 then prove the identity:
 ሺ͸࢛ሻ൉ሺ࢜ ൈ࢝ሻൌെሺ൫࢛ ൈሺ͵࢝ሻ൯൉ሺʹ࢜ሻሻ

7. Given the lines ख૚: ሺݔǡݕǡݖሻൌሺͳǡ͵ǡͲሻ൅ݐሺͶǡ͵ǡͳሻ, ख૛ǣሺݔǡݕǡݖሻൌሺͳǡʹǡ͵ሻ൅ݐሺͺǡ͸ǡʹሻǡ
 the plane च: ʹݔ െݕ͵ ൅ ݖ ൌͳͷ and the point ܣሺͳǡͲǡ͹ሻǤ
 a) Show that the lines ख૚ख૛ lie in the same plane and find the general equation of
 this plane.
 b) Find the distance between the line ख૚ and the Y-axis.

Ú戀

Ú b

Ú
Ú

4

9. Let ܵ ൌ ሼ݌ሺݔሻ א ܲଶȁ݌ሺͳሻ ൌ ݌ሺʹሻሽ.

a) Show that S is a subspace of ܲଶ

Ǥ

b) Find a basis and the dimension of S.

c) Find the coordinat es of the vector ݌ ሺݔሻ ൌ ͷݔଶ െ ͳͷݔ ͹ ൅ relative to the basis found in

par t (b).

10. Determine whether the following sta tement is true or false. J usti fyt50.L