Exam Prep Math 204 2020

1) a) Find the determinant of A = $\begin{pmatrix} 1 & 0 & 2 & 4 \\ 3 & 1 & 1 & 7 \\ 2 & 0 & 6 & 8 \\ 5 & 2 & 1 & 3 \end{pmatrix}$

   b) Use Cramer's rule to solve:
   $2x_1+x_2+x_3= 7$
   $x_1 - x_2+x_3= 4$
   $3x_1+5x_2+2x_3= 3$

2) Solve the following equation for a (2x2) matrix.

$$\begin{pmatrix} 1 & 1 \\ 1 & 2 \end{pmatrix} X + \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}^{-1} X \begin{pmatrix} 1 & 5 \\ 1 & 2 \end{pmatrix} = \begin{pmatrix} 1 & 1 \\ 1 & 1 \end{pmatrix}$$

3) a) Let v_1 = (2 ,3 ,4) , v_2 = (1, 0, 2). Find a and b so that a(2,3,4)+ b((1,0,2) = (4,3,8).
   b) Find v_3 so that v_2, v_1, v_3, is a basis for R^2.

4) find the distance from the point A – (1, 2, 5) to the point of intersection of the plane below:
   $x – y + 3z = 1$

5) Let $P_1(1,1,1)$, $P_2(1,3,4)$, $P_3(2,1,5)$.
   a) Find the area of the triangle with the vertices above.
   b) Find the equation of the plane containing the vertices.

6) Let P(1,2,3) be a point. Let n = (1,2,3)
   a) Find the point-normal equation of the plane though P with normal n.
   b) Express the equation of the plane in the form ax + by +cz + d =0.

7) Let l be line with the parametric equation:
   x = 1 + t , y = -3 + 2t , z = -4 + 5t
   Let V = (2,1,3). Find w_1, w_2 so that $V = w_1 + w_2$ and w_1 is parallel to l and w_2 is perpendicular to l.

8) Use gauss-jordan method to solve system below:

$2x_1 - x_2 + 4x_3 = 1$

$x_1 + 2x_2 - x_3 = 4$

$3x_1 - x_2 + 2x_3 = 5$

9) Let $A = \begin{bmatrix} 1 & 2 & 0 & 4 & 5 & 0 & 6 \\ 0 & 0 & 1 & 2 & 3 & 0 & 7 \\ 0 & 0 & 0 & 0 & 0 & 1 & 8 \end{bmatrix}$ and $X = \begin{bmatrix} x \\ y \\ z \\ t \\ u \\ v \\ w \end{bmatrix}$,

Find a basis of the solution space of AX =0

10) Let $A = \begin{bmatrix} 4 & 1 & -1 \\ 2 & 5 & -2 \\ 1 & 1 & 2 \end{bmatrix}$

a) Find all the eiganvalues of A.
b) Is A diagonalizable, if yes find P so that $P^{-1}AP = D$ diagonal.

11) Let $A = \begin{pmatrix} 2 & 3 \\ 3 & -6 \end{pmatrix}$. Find A^{1000}.