# Assignment 2

**Due date: 20 Oct 2016 (Thur)**

Exercise 2.1:

2. Solve the following systems of linear equations.

   (c)
   $$\begin{cases} 2x_1 & - & x_2 & + & 5x_3 & = & 15 \\ x_1 & + & 3x_2 & - & x_3 & = & 4 \\ x_1 & - & 4x_2 & + & 6x_3 & = & 11 \\ 3x_1 & + & 9x_2 & - & 3x_3 & = & 12 \end{cases}$$

   (e)
   $$\begin{cases} x_1 & - & 2x_2 & + & x_3 & + & x_4 & = & 1 \\ x_1 & - & 2x_2 & + & x_3 & - & x_4 & = & -1 \\ x_1 & - & 2x_2 & + & x_3 & + & 5x_4 & = & 5 \end{cases}$$

Exercise 2.4:

3. For the given matrix $\mathbf{A}$, evaluate $\mathbf{A}^{-1}$ by finding the adjoint matrix adj$\mathbf{A}$ of $\mathbf{A}$.

   (b) $\mathbf{A} = \begin{pmatrix} 2 & -3 & 5 \\ 0 & 1 & -3 \\ 0 & 0 & 2 \end{pmatrix}$

4. Use Cramer's Rule to solve the following linear systems.

   (a)
   $$\begin{cases} 4x_1 & - & x_2 & - & x_3 & = & 1 \\ 2x_1 & + & 2x_2 & + & 3x_3 & = & 10 \\ 5x_1 & - & 2x_2 & - & 2x_3 & = & -1 \end{cases}$$

Exercise 2.5:

1. Find the equation of the parabola of the form $y = ax^2 + bx + c$ passing through the given set of three points.

   (a) $(0, -5), (2, -1), (3, 4)$

2. Find the equation of the circle passing through the given set of three points.

   (a) $(-1, -1), (6, 6), (7, 5)$

Exercise 3.3

1. Determine whether the given set of vectors are linearly independent in $\mathbb{R}^3$.

   (e) $\mathbf{v}_1 = (3, -1, -2), \mathbf{v}_2 = (2, 0, -1), \mathbf{v}_3 = (1, -3, -2)$

   (f) $\mathbf{v}_1 = (1, -2, 2), \mathbf{v}_2 = (3, 0, 1), \mathbf{v}_3 = (1, -1, 2)$

Exercise 3.5

1. Find a basis for the null space , a basis for the row space and a basis for the column space for the given matrices.

(c) $\begin{pmatrix} 3 & -6 & 1 & 3 & 4 \\ 1 & -2 & 0 & 1 & 2 \\ 1 & -2 & 2 & 0 & 3 \end{pmatrix}$

(d) $\begin{pmatrix} 1 & 1 & -1 & 7 \\ 1 & 4 & 5 & 16 \\ 1 & 3 & 3 & 13 \\ 2 & 5 & 4 & 23 \end{pmatrix}$