1. Solve the following system of linear equations:

$$\begin{cases} x - 2y + z = 2 \\ -2x + y - z = -1 \\ -x + y + z = 0 \end{cases}$$

2. Find the inverse of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & 4 & 8 \end{bmatrix}$.

3. Find the determinant of $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 5 & 6 \\ 3 & 4 & 8 \end{bmatrix}$.

4. If $\det\begin{bmatrix} a & b & c \\ d & e & f \\ g & h & i \end{bmatrix} = 4$ find the following

$$\det\begin{bmatrix} g & h & i \\ 4d & 4e & 4f \\ a-g & b-h & c-i \end{bmatrix}$$

5. Find the linear transformation $T\colon \mathbb{R}^2 \to \mathbb{R}^2$ that rotates each point $\theta°$ counterclockwise about the origin, where $\theta° = 5\pi/6$.

6. Find the standard matrix of the linear transformation $T\left(\begin{bmatrix} x \\ y \\ z \end{bmatrix}\right) = \begin{bmatrix} \pi x - e^2 y \\ \sqrt{\pi} y - z \\ 3x - 2y + z \end{bmatrix}$.

7. Find the standard matrix of a linear transformation that first rotates a point counterclockwise about the origin by $\pi/4$ radians and then projects the result onto the y-axis.

8. A woman has a ring, bracelet, and necklace that she wants to give to three of her 5 daughters.
   a) How many ways can she do this?
   b) The woman also has 2 identical pendants which she is going to give to two of her daughters. How many ways can she do this?

9. The department of Mathematics and Statistics at a university has 12 mathematicians and 5 statisticians.
   a) If 6 people are randomly selected from the department to serve on a committee, what is the probability there will be 4 mathematicians and 2 statisticians on the committee?
   b) If 6 people are randomly selected for the committee, what is the probability that at least 2 will be statisticians?

10. A small company has found that there is a 10% chance that an employee will call in sick on a Friday. If there are 9 employees in the company, what is the probability that
    a) Exactly 4 people call in sick on a Friday?
    b) At most 1 person calls in sick on a Friday?

11. At a university, a computer science major can select either a BSc. with honours or a standard BSc. 30% of graduates selected the honours program (H). 90% of graduated obtained employment in the computing science field (E). 2% of graduates have an honours degree and did not get employment in the computing science field.
    a) Find $P(H \cup E^c)$.
    b) If a student has an honours degree, what is the probability they got employment in the field?
    c) If a student is not employed in the field, what is the probability they have an honours degree?
    d) Are H and E independent? Explain why or why not mathematically.