1. $\begin{pmatrix} X_1 \\ X_2 \\ X_3 \end{pmatrix} \sim N \left(\begin{pmatrix} 1 \\ 2 \\ 3 \end{pmatrix}, \begin{pmatrix} 2 & 0 & 1 \\ 0 & 1 & 0 \\ 1 & 0 & 1 \end{pmatrix} \right).$

   (1) Find the distribution of $\begin{pmatrix} X_1 \\ X_3 \end{pmatrix}$

   (2) Find the distribution of $X_1 \left| \begin{pmatrix} X_2 \\ X_3 \end{pmatrix} = \begin{pmatrix} 5 \\ 6 \end{pmatrix} \right.$

   (3) Find the conditional probability of $X_1 > 4$ given $\begin{pmatrix} X_2 \\ X_3 \end{pmatrix} = \begin{pmatrix} 5 \\ 6 \end{pmatrix}$, i.e.,
   $P(X_1 > 4 | X_2 = 5, X_3 = 6)$.

2. p107 2.30 (a)-(i)

3. p201 4.4 (a) Find the distribution of $3X_1 - 2X_2 + X_3$

4. p202 4.7 (b)