2 Chapter 2: Determinants

2.3 Cramer’s Rule

1. this section presents a method to compute the inverse of a matrix, given that such inverse exists (i.e. that its determinant is nonzero)

2. the adjoint of a matrix $\text{adj}(A) = \begin{pmatrix} A_{11} & A_{21} & \ldots & A_{n1} \\ A_{12} & A_{22} & \ldots & A_{n2} \\ \vdots & \vdots & \ddots & \vdots \\ A_{1n} & A_{2n} & \ldots & A_{nn} \end{pmatrix}$ where $A_{i,j}$ is $(-1)^{i+j}$ times the determinant of the matrix $A$ taking away row $i$ and column $j$

3. in the matrix $\text{adj} A$ above, note that we have a transposed matrix, since for example the entry in row 2 column 1 is $A_{12}$ instead of the standard $A_{21}$

4. inverse matrix: $A^{-1} = \frac{1}{\det(A)} \cdot \text{adj}(A)$

5. Cramer’s rule: find solutions of $Ax = b$ using $x_i = \frac{\det A_i}{\det A}$, where $x = (x_1, x_2, \ldots, x_n)$