1. To reduce 1.1#26 (Problem 2 on PS1) to Gaussian by-hand we can apply $\begin{bmatrix} 2 & 4 & f \\ c & d & g \end{bmatrix} \xrightarrow{r_2' = -\frac{c}{2} r_1 + r_2} \begin{bmatrix} 2 & 4 & f \\ 0 & -2c+d & -\frac{c}{2}f + g \end{bmatrix}$. The book asks us what conditions we have on c and d to ensure consistency no matter what values f and g take on. The reasoning is:

   a) The system is always consistent because Maple shows us that we have full pivots via ReducedRowEchelon equaling $\begin{bmatrix} 1 & 0 & -\frac{1}{2}\frac{df-4g}{-d+2c} \\ 0 & 1 & -\frac{1}{2}\frac{cf-2g}{-d+2c} \end{bmatrix}$, so c and d can take on any values, no matter what f and g are.

   b) The system is never consistent because we always obtain $\begin{bmatrix} 0 & 0 & \text{nonzero} \end{bmatrix}$, so there are no values of c and d that work.

   c) We must have $d \neq 2c$ because otherwise we'll obtain $\begin{bmatrix} 0 & 0 & \text{nonzero} \end{bmatrix}$ whenever $g \neq \frac{c}{2} f$.

   d) Either $d \neq 2c$ to give us a pivot for x_2 or we make x_2 free by setting $g = \frac{c}{2} f$ whenever $d = 2c$.

   e) Other

Solutions

1. c)