$$\begin{bmatrix} 6 & 12 & 1206 & 66 & 1 & e & \pi^3 & e^2 \\ 3 & 7 & 703 & 3 & 0 & \pi & 0 & \pi^2 \\ 4 & 11 & 1104 & 4 & 0 & \sqrt{7} & 0 & 1 \\ 5 & 3 & 305 & 5 & 0 & -3 & 0 & 9 \\ 0 & 0 & 0 & 0 & 0 & 6 & 0 & 36 \end{bmatrix}$$

To begin with we find dependent and independent columns. We do this by going from left to right. At each column, we note whether or not it can be made as a linear combination of the columns to the left. Dependent columns we will call d_i, and independent columns we will call f_i.

$$f_1 = \begin{bmatrix} 6 \\ 3 \\ 4 \\ 5 \\ 0 \end{bmatrix}, f_2 = \begin{bmatrix} 12 \\ 7 \\ 11 \\ 3 \\ 0 \end{bmatrix}, f_3 = \begin{bmatrix} 66 \\ 3 \\ 4 \\ 5 \\ 0 \end{bmatrix}, f_4 = \begin{bmatrix} e \\ \pi \\ \sqrt{7} \\ -3 \\ 6 \end{bmatrix}, f_5 = \begin{bmatrix} e^2 \\ \pi^2 \\ 1 \\ 9 \\ 36 \end{bmatrix}$$

$$d_1 = \begin{bmatrix} 1206 \\ 703 \\ 1104 \\ 305 \\ 0 \end{bmatrix}, d_2 = \begin{bmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}, d_3 = \begin{bmatrix} \pi^3 \\ 0 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

as

$$\begin{aligned} d_1 &= f_1 + 100 f_2 \\ d_2 &= \frac{f_3 - f_1}{60} \\ d_3 &= \pi^3 \frac{f_3 - f_1}{60} \end{aligned}$$

Now we make each column of our reduced row echelon form one by one. If the i-th column of the original matrix was independent, the i-th column of our reduced matrix will be all 0s except for a single 1, just going down in order. So $c_1 = f_1$, meaning our first column will have only a 1 in the first row. Skipping ahead, $c_4 = f_3$, so the fourth column will have a 1 in the third row. That means we have something like this:

$$\begin{bmatrix} 1 & 0 & ? & 0 & ? & 0 & ? & 0 \\ 0 & 1 & ? & 0 & ? & 0 & ? & 0 \\ 0 & 0 & ? & 1 & ? & 0 & ? & 0 \\ 0 & 0 & ? & 0 & ? & 1 & ? & 0 \\ 0 & 0 & ? & 0 & ? & 0 & ? & 1 \end{bmatrix}$$

Then, each column corresponding to a dependent column of the original matrix will have coefficients representing how you make them from the independent columns. So since $c_3 = d_1$, and we have $d_1 = f_1 + 100 f_2$, the third column in reduced row echelon form is

$$\begin{bmatrix} 1 \\ 100 \\ 0 \\ 0 \\ 0 \end{bmatrix}$$

With a 1 in the first row and a 100 in the second. There are 5 independent columns, and our matrix has 5 rows, so we just associate each row with an independent column in order. That means we can fill in the rest of the matrix easily:

$$\begin{bmatrix} 1 & 0 & 1 & 0 & -\frac{1}{60} & 0 & -\frac{\pi^3}{60} & 0 \\ 0 & 1 & 100 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 1 & \frac{1}{60} & 0 & \frac{\pi^3}{60} & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 \end{bmatrix}$$