

HW 2

$$\begin{bmatrix} a & b \\ c & d \end{bmatrix} \begin{bmatrix} x_1 & 0 \\ 0 & x_2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 1 & 0 \\ -\frac{c}{a} & 1 \end{bmatrix} \begin{bmatrix} a & b \\ c & d \end{bmatrix} = \begin{bmatrix} a & b \\ 0 & -\frac{c}{a}b + d \end{bmatrix}$$

Now do back-sub.

$$\begin{bmatrix} a & b \\ 0 & -\frac{c}{a}b + d \end{bmatrix} \begin{bmatrix} x_{11} & x_{21} \\ x_{12} & x_{22} \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ -\frac{c}{a} & 1 \end{bmatrix} \iff A A^{-1} = I$$

$$a x_{11} + b x_{12} = 1$$

$$\left(-\frac{c}{a}b + d\right) x_{12} = -\frac{c}{a}$$

$$a x_{21} + b x_{22} = 0$$

$$\left(-\frac{c}{a}b + d\right) x_{22} = 1$$

$$x_{12} = \frac{-\frac{c}{a}}{-\frac{c}{a}b + d}$$

$$a x_{11} + b \left(\frac{-\frac{c}{a}}{-\frac{c}{a}b + d} \right) = 1$$

$$x_{11} = \frac{1 - b \left(\frac{-\frac{c}{a}}{-\frac{c}{a}b + d} \right)}{a}$$

$$x_{21} = \frac{1}{-\frac{c}{a}b + d}$$

$$a x_{21} + b \left(\frac{1}{-\frac{c}{a}b + d} \right) = 1$$

$$x_{21} = \frac{1 - b \left(\frac{1}{-\frac{c}{a}b + d} \right)}{a}$$

SIMPLIFY
&
VERIFY