LU decomposition

Find the condition number of the 3x3 Hilbert Matrix and calculate how many digits of precision will be lost in solving the linear system $Ax = b$:

$$A = \begin{bmatrix} 1 & \frac{1}{2} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{3} & \frac{1}{4} \\ \frac{1}{3} & \frac{1}{4} & \frac{1}{5} \end{bmatrix}$$

Remember that you'll have to perform LU decomposition and find the inverse. Use the Euclidean matrix norm. You **do not** have to use scaled partial pivoting and a permutation matrix. Gaussian elimination is fine.