

Quiz #1 (CSE 4190.313)

Monday, March 18, 2015

Name: _____ ID No: _____

1. (10 points) If A has column 1 + column 2 = column 3, show that A is not invertible:
 - (a) (3 points) Find a nonzero solution \mathbf{x} to $A\mathbf{x} = \mathbf{0}$.
 - (b) (4 points) Explain why elimination keeps column 1 + column 2 = column 3.
 - (c) (3 points) Explain why there is no third pivot.

2. (4 points) If A and B have nonzeros in the positions marked by $*$, which zeros are still zero in their factors L and U ?

$$A = \begin{bmatrix} * & * & * & * \\ * & * & * & 0 \\ 0 & * & * & * \\ 0 & 0 & * & * \end{bmatrix}, \quad B = \begin{bmatrix} * & * & * & 0 \\ * & * & 0 & * \\ * & 0 & * & * \\ 0 & * & * & * \end{bmatrix}$$

3. (6 points) Write down the 5×5 finite-difference matrix equation ($h = \frac{1}{6}$) for

$$-\frac{d^2u}{dx^2} = f(x), \quad \frac{du}{dx}(0) = \frac{du}{dx}(1) = 0.$$