MATH 54 FALL 2016: DISCUSSION 102/105 QUIZ#4

GSI: CHRISTOPHER EUR, DATE: 9/23/2016

STUDENT NAME: _____

Problem 1. Answer (a) and (b) simply by saying "yes" or "no," and return to this problem after finishing Problem 2 below.

(a) (1 point) Are the theory and example worksheets helpful? Do you use the write-ups of your classmates to study?

(b) (1 point) Do you find working in groups helpful for learning?

(c) Would you prefer to have the me do the Theory & Example in a lecture style rather than in group work? How much do you learn from working through the Theory & Examples worksheet? Would you like to do more problems instead?

(d) Are my explanations clear / too fast / too slow?

(e) How did you feel about Midterm 1?

(f) Any other questions/comments/concerns?

Problem 2. Fill in the blank to complete the proof of the following statement. (2 points each)

Suppose we have a 2×2 *matrix* $A = \begin{bmatrix} a & c \\ b & d \end{bmatrix}$ *such that* $a \neq 0$. *Show that* A *is invertible if and only if* $ad - bc \neq 0$. (Side note: this statement is true even when $a = 0$).

Proof. Since $a \neq 0$, we can do the row operation of adding $(-\frac{b}{a})\times$(row1) to (row2), which gives us the matrix $\underline{\begin{bmatrix} a & c \\ 0 & d - \frac{bc}{a} \end{bmatrix}}$. Now, in this matrix, we see that the first column is always a pivot column since $\underline{a \neq 0}$. The second column would NOT be pivot column exactly when $\underline{d - \frac{bc}{a} = 0}$, which by multiplying a on both sides is equivalent to saying $ad - bc = 0$. So, exactly when $ad - bc \neq 0$, we have that the second column is also pivot. A square matrix is invertible when each column is a $\underline{\text{pivot}}$, and hence we are done.