Math 196-47, Mr. Church, Homework 4

Due at the beginning of class on Monday, April 20.

Please staple your homework.

1. Find the determinant of the matrix

$$A = \begin{bmatrix} 1 & 1 & 3 \\ 4 & 4 & 3 \\ 0 & -3 & 5 \end{bmatrix}$$

   (a) by cofactor expansion on the second row

   (b) by Gaussian elimination

   (c) by the "3×3 diagonals-minus-diagonals" shortcut.

2. Find the determinant of the matrix

$$B = \begin{bmatrix} 2 & 1 & 0 & 0 \\ 1 & 2 & 1 & 0 \\ 0 & 1 & 2 & 1 \\ 0 & 0 & 1 & 2 \end{bmatrix}$$

   (a) by cofactor expansion (on whichever row or column you like)

   (b) by Gaussian elimination.

   (c) Check that the "diagonals shortcut" does **not** give the correct answer here [you do not need to write anything down for (c)].

3. (a) Using the "3×3 diagonals-minus-diagonals" shortcut, find the general form for the determinant of a diagonal matrix

$$A = \begin{bmatrix} a & 0 & 0 \\ 0 & b & 0 \\ 0 & 0 & c \end{bmatrix}$$

   (b) Does a similar formula hold for 4×4 diagonal matrices? Justify your answer.