Properties of Determinants

MATH 204: Linear Algebra
Prepare for class October 19, 2018 Name (Print): _____

After rereading Section 3.1 and reading Section 3.2, work through the following ideas.

1. State Theorem 3.1: Determinants and Cofactor Expansions Theorem from page 168.

2. Theorem 3.1 says that we can compute the determinate by expanding across any row or column. Why might we want to expand across something other than the first row?

3. We discussed the term *triangular* matrix back in Chapter 1. Draw a diagram of a triangular matrix. We can get more specific and talk about upper triangular or lower triangular matrices. Was the diagram you drew an upper or lower triangular matrix based on your intuitive idea of the definition? Draw an example of the other kind (lower if you did upper and upper if you did lower).

4. State Theorem 3.2: Determinants of Triangular Matrices Theorem from page 169.

5. Compute the determinant of one of your triangular matrices without using Theorem 3.2. Then compute using Theorem 3.2. Do your answers match?

6. State Theorem 3.3: Row Operations and Determinants Theorem from page 171.

7. Suppose $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ and $B = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$.

(a) Use Theorem 3.2 to find the determinants of A and B.

(b) Explain carefully how Theorem 3.3 confirms the determinant of B given the determinant of A.

8. Suppose A and B are two $n \times n$ matrices that are row equivalent. Suppose that there are two row operations to get from A to B: one is to replace the first row of A with 7 times the first row of A, and the other is to interchange rows 2 and 5. Write the determinant of B in terms of the determinant of A.

9. Write down any questions you have on the reading.