

MATH 351, FALL 2017, QUIZ #2

FRIDAY, OCTOBER 13, 2017



Given

$$A = \begin{bmatrix} 1 & 11 & 1 \\ 0 & -10 & 7 \\ 0 & 0 & 3 \end{bmatrix}, \quad B = \begin{bmatrix} 1 & 1 & -2 \\ 0 & 3 & -3 \\ 1 & -2 & 1 \end{bmatrix}$$

compute  $\text{rank}(AB)$ .

**Solution.** The matrix  $A$  is invertible since it is upper triangular with non-zero entries on the main diagonal. Therefore  $\text{rank}(AB) = \text{rank}(B)$ . The third row of  $B$  is the difference of the first two rows, which are linearly independent (only one has a non-zero first entry). It follows that  $\text{rank}(AB) = \text{rank}(B) = 2$ .