Name:

Let $X = \{0, 1, 2\}$, $Y = \{a, b\}$, and $Z = \{d, e, f, g\}$ Let R_1 be a relation from X to Y defined as $R_1 = \{(0, a), (0, b), (1, a), (2, b)\}$ and $R_2 = \{(a, d), (b, d), (b, f)\}.$

1. Write the matrix of each relation above using the ordering of sets X, Y, and Z as they are listed above.

2. Take a moment to determine whether each relation is a function, one to one, onto.

3. Why weren't you asked to determine if the relations were symmetric, reflexive, or antisymmetric?

4. Using the definitions, determine the ordered pairs in $R_2 \circ R_1$.

5. Now multiply the two matrices from part (1) to show it is (essentially) the matrix of the composition of the two relations.

6. Why is the word *essentially* needed here?

7. Can you explain why you multiplied the matrices in the order you did?