# Homework #4

## Math 3260
## Due November 2

1. Given the basis $B = \{[1,0,0],[0,1,0],[0,0,1]\}$ and the basis $B' = \{[1,2,-1],[2,5,-2],[0,1,1]\}$ for $R^3$

    (a) Find the transition matrix from $B$ to $B'$.

    (b) Find $[x]_{B'}$ given $x = [1,0,-2]$.

2. For the following operators,

    - determine the domain and codomain for the operator, for example $T : R^3 \to R^2$, $T : R^2 \to R^2$, etc. and then prove whether or not the operator defines a linear transformation. Make sure to show all necessary work! If it is a linear transformation, complete the following questions. If not, go on to the next operator.

    - find the standard matrix for the linear transformation $T$.

    - determine if the transformation is one-to-one. If so, go on to the next part. Otherwise, go on to the next operator.

    - find the standard matrix for the inverse operator.

    - find $T^{-1}(w)$

    (a) $T(v_1, v_2, v_3) = (v_1 - 2, v_2 + v_3)$

    (b) $T(v_1, v_2, v_3, v_4) = (v_3, v_1 + v_4, -v_2 + 3v_3, 2v_1 + v_2 + 5v_3 - 3v_4)$

    (c) $T(v_1, v_2, v_3) = (v_1 + 2v_2 + 3v_3, 2v_1 + 5v_2 + 3v_3, v_1 + 8v_3)$