Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ ID\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_Group\_\_\_\_\_\_\_\_\_\_

**Part I:** (5 points) True (T) |False (F) questions. (1 point deduction for each wrong answer)

1. \_\_\_\_\_ To prove that a function *f* is one-to-one is to show that if *a*=*b* then *f*(*a*)=*f*(*b*)
2. \_\_\_\_\_ In every homomorphism, only a zero vector in the domain can be mapped to a zero vector in the codomain.
3. \_\_\_\_\_ Vector spaces P4 , M2x2 and 4 are isomorphic.
4. \_\_\_\_\_ Let  where . Function *h* is linear.
5. \_\_\_\_\_ The row space of a 3x5 matrix is always isomorphic to its column space.

**Part II:** Answer the questions.

1. (3 points) Consider isomorphism RepB(.):  where *B* = <1, 1+*x*>. Find the image of these elements of the domain:

a) 3 – 2*x*  b) 2 + 2*x*  c) *x*

1. (2 points) Suppose that a vector space *V* has 4 elements. How many different automorphisms on *V* are there?