

Name: _____

Math 290 – Spring 2012 – Bonus HW

(Show all your work in this sheet. Use the other side if you need more space.)

Problem 1. ($5 + 5 = 10$ points) Consider the matrix

$$A = \begin{bmatrix} 0 & 3 & -2 & 4 \\ 0 & 0 & -1 & 2 \\ 0 & 0 & 0 & 7 \end{bmatrix}.$$

(i) What is the rank of A ? (Show work and/or explain your answer.)

Answer: rank(A) =

(ii) Find the dimension of the solution space of $Ax = 0$. **Note that x is four-dimensional.** (Show work and/or explain your answer.)

Answer: dimension of the solution space =

Problem 2. ($5 + 5 = 10$ points) Let P_2 be the vector space of polynomial of degree less than or equal to 2 and consider the linear transformation $T : P_2 \rightarrow P_2$ given by $T(a_0 + a_1x + a_2x^2) = a_0 - 2a_2x^2$.

(i) Find the dimension of the range of T . (Show work and/or explain your answer.)

Answer: dimension of the range of T =

(ii) Find a non-zero polynomial p in the kernel of T . (Show work and/or explain your answer.)

Answer: $p(x) =$