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| Quiz 3 – Spring 2010Dusty Wilson Math 220 No work = no credit **Calculators Allowed** | **Name**: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_  *His [Gram’s] brilliance and scientific training together with*  *his practical skills made his contributions to pure and*  *applied mathematics very significant.*  Regarding Jorgen Gram  (1850 - 1916)  Dutch mathematician |

# (0 pts) The quote above is by Hieronymous Georg Zeuthen and speaks of the work of Jorgen Gram – one of the mathematicians for whom the Gram-Schmidt orthogonalization algorithm is named.

(1 pt) If *A* is an *(m x n*) matrix, then (fill in the blanks):

 and 

(2 pts) What is a basis for a subspace *W*?

(6 pt) Suppose *A* is an *(m x n*) matrix and the equation  has non-trivial solutions.

1. What can be said of the columns of *A*?
2. What can be said of the null space of *A*?
3. What can be said of the rank of *A*?

(10 pts) Let .

1. Find the null space of *A*.
2. Find a basis for the range of *A*.
3. Find the nullity and rank of *A*.

Rank: \_\_\_\_\_\_\_\_\_\_\_\_\_ and Nullity: \_\_\_\_\_\_\_\_\_\_\_\_\_

1. Is your basis orthogonal – why or why not?

(1 pt) If you could attend one professional event from the past or present (personal, sporting, dramatic, academic, political, … ) what would it be?

(1 pt) Give at least one specific use we have found for the transpose of a matrix.