<u>VMLS - SG Chapter 10 - Matrix Multiplication</u> Name:_____

Always include this title page with your PDF. Include your name above.

- Submit your work in Gradescope as a PDF - you will identify where your "questions are."
- Identify the question number as you submit. Since we grade "blind" if the questions are NOT identified, the work WILL NOT BE GRADED and a 0 will be recorded. Always leave enough time to identify the questions when submitting.
- One section per page (if a page or less) - We prefer to grade the main solution in a single page, extra work can be included on the following page.
- Long instructions may be removed to fit on a single page.
- **Do not start a new question in the middle of a page.**
- Solutions to book questions are provided for reference.
- You may NOT submit given solutions - this includes minor modifications - as your own.
- Solutions that do not show individual engagement with the solutions will be marked as no credit and can be considered a violation of honor code.
- If you use the given solutions you must reference or explain how you used them, in particular...

For full credit, EACH book exercise in the Study Guides must use one or more of the following methods and FOR EACH QUESTION. Identify the number the method by number to ensure full credit.

Method 1 - Provide original examples which demonstrate the ideas of the exercise in addition to your solution.

Method 2 - Include and discuss the specific topics needed from the chapter and how they relate to the question.

Method 3 - Include original Python code, of reasonable length (as screenshot r text) to show how the topic or concept was explored.

Method 4 - Expand the given solution in a significant way, with additional steps and comments. All steps are justified. This is a good method for a proof for which you are only given a basic outline.

Method 5 - Attempt the exercise without looking at the solution and then the solution is used to check work. Words are used to describe the results.

Method 6 - Provide an analysis of the strategies used to understand the exercise, describing in detail what was challenging, who helped you or what resources were used. The process of understanding is described.

1. (40 pts) Consider pages 179 - 181. Demonstrate with simple matrix examples:

- The 4 properties of matrix multiplication.
- The inner product and matrix-vector products
- A block matrix multiplication
- A column interpretation of matrix-matrix product
- Multiple sets of linear equations (skip row interpretation if you wish)
- Inner product representation
- Gram Matrix
- Outer Product representation

You can use the same simple matrices where possible - however, don't use the identity matrix. You may wish to do more examples to illustrate the additional types of products given. You may use multiple pages.

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2.   (20 pts) Solve and Explain the solution to 10.39 here in your own words. (Since you are given a solution, you will be graded on your ability to explain).

3. (20pts) Solve and Explain the solution to 10.40 here in your own words. (Since you are given a solution, you will be graded on your ability to explain).

4.   (20pts) Solve and Explain the solution to 10.43 here in your own words. (Since you are given a solution, you will be graded on your ability to explain).

(If you watched the author videos, this where to take a moment to sit in awe of the speed of computers)