MATH 513: Linear Algebra

Last Updated: August 17, 2020

Suggested Practice Problems from
C. Meyer, *Matrix Analysis and Applied Linear Algebra*, SIAM 2000.

Guidelines: Suggested Practice Problems are regularly assigned but not collected. Do them promptly. Keep a separate homework notebook. The problems marked with ∗ are the slightly harder ones, while the unmarked problems are considered **routine** and everyone should be able to solve them. The problems marked with † are optional and only for the very interested parties!

Your solutions should always include reasoning. This helps reinforce logical structure and trains you in critical thinking. Write clearly. Do not put an equals sign between unequal quantities, or quantities you have not yet proved are equal. Use words like "hence", "therefore" to connect statements or equations, and indicate the chain of reasoning. Interpret your answers. Use "we are given", "we want to show that" to distinguish clearly between what is given and what is to be found. Practice writing *complete solutions* early since you will be expected to do so on the exam.

---

§1.2.	p.11	5, 8, 10, 11, 12, 14, $15^\dagger$, 16. († problem is a good exercise for CS students)
§1.3.	p.17	3.
§1.4.	p.20	*** Skip *** (students interested in scientific computing might find this section interesting. Prerequisite is the first course in differential equations.) $1^\dagger$, $2^\dagger$.
§1.5.	p.30	*** Skip *** (students interested in numerical analysis, scientific computing, or computer science might find this section interesting.)
§1.6.	p.39	*** Skip ***

---

§2.1.	p.46	3, 5.
§2.2.	p.51	1(b), 3.
§2.3.	p.55	1 (easy, but make sure you review this), 3, 4, 5.
§2.4.	p.62	6, 7.
§2.5.	p.70	1(c,d), 5, 6.
§2.6.	p.76	*** Skip ***

---

§3.1.	p.87	Read the historical remark.
§3.2.	p.87	3, 4, 5, 6, 7, 8.
§3.3.	p.92	Skip for now
§3.4.	p.94	Skip for now
§3.5.	p.102	4, 5, 6, 7, 8, 9.
§3.6.	p.112	1, 2, 3, 5, 7, 11, 12.
§3.7.	p.121	1 (easy, but make sure you review this), 5, 6, 7, 8, 9 ,10, $11^\dagger$.
§3.8.	p.130	Read pages 124 – 126.
§3.9.	p.139	5, 6, 8, 9, 10.
§3.10.	p.155	5, 7, 9, 10.
		*** Skip pages 150-153***

---

§4.1.	p.167	1, 2, 7, 8, 10, 11, 12.
§4.2.	p.178	1*, 2, 3, 4, 5, 6*, 7, 8, 9, 11, 12, 13.
		Starred problems are mainly hand computations, which you should be able to make.
§4.3.	p.190	1*, 2*, 5, 6, 7, 8, 10, 11, 12, 13.
		Starred problems are mainly hand computations, which you should be able to make.
§4.4.	p.206	1*, 2*, 3*, 4*, 6*, 8, 10, 11, 12, 15, 16.
		Starred problems are mainly hand computations, which you should be able to make.
§4.5.	p.219	2*, 4, 5, 8, 9, 10, 12, 14, 16, 18, 19
§4.6.	p.234	Skip
§4.7.	p.247	$1 - 19$ (**ALL!**)
§4.8.	p.257	1, 2, 3, 4, 5, 6, 8.
§4.9.	p.266	3, 4, 5, 6, 7.

§5.1.	p.276	1, 2, 3, 5, 6, 8(a), 9, 10.
§5.2.	p.285	*** Skip for now ***
§5.3.	p.292	1, 2, 3, 4, 5, 7, 8, 9.
§5.4.	p.303	1, 2, 3, 4, 6, 7, 8, 9, 12, $13^\dagger$, $14^\dagger$, $15^\dagger$, 17.
		Problems with † are particularly important for PhD students!
§5.5.	p.317	1(a-b), 2, 4, 5, 7*, 8.
§5.6.	p.335	1, 2, 3, 4, 5, 6, 7, 8, 10, 11, 12, 13,14, 14, 15, 16, 19, 20.
§5.7.	p.354	*** SKIP ***
§5.8.	p.376	*** SKIP ***
§5.9.	p.390	1, 3 –10, 13, 16*, 17*, 19* (starred problems are are a bit harder).
		Skip Example 5.9.2 (p.389-390)
§5.11.	p.409	1, 2, 3, 5*, 14* (starred problems a bit harder).
		On p. 405, read material after gray box, but do not stress about it
§5.13.	p.439	1, 2, 3, 5, 8.
		Know how formulas for general projectors (§5.9) simplify in case of orthogonal projectors.
		Skip Examples 5.13.2 and 5.13.5 (p.436-439)

§7.1.	p.500	TBA
§7.2.	p.285	TBA
§7.3.	p.538	TBA
§7.4.	p.546	*** SKIP ***
§7.5.	p.556	*** SKIP ***
§7.6.	p.335	TBA + Supplemental Portfolio Problems