(Dense Structured) Matrix Vector Multiplication May 24-26, 2018

EXERCISES

- The Exercise numbers below refer to the corresponding exercise numbers in the notes. There is a *small* chance that some of the exercise numbers might get updated once the notes undergo further revision. To be on the safe side, there is also a short description of the exercise for some redundancy.
- Please typeset your solutions.
- The points for each exercise is intended to signal the difficulty of the problem. However, this is my guess so it might not match with the level of difficulty for you.

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1. (10 points) Exercise 1.19 (Distance of a code is at most $m - n + 1$).
2. (10 points) Exercise 2.8 (Kronecker substitution).
3. (10 points) Exercise 2.9 (Two specific polynomials are the same).
4. ($10 + 30 = 40$ points) Exercise 2.10. Showing that $\mathsf{spw}(A)$ is within constant factor of the smallest linear circuit for computing $\mathbf{Ax}$ is worth 10 points. The other direction if worth 30 points.
5. (10 points) Exercise 4.3 (Extending Baur-Strassen to handle division). You can do the proof only for $\mathbb{F} = \mathbb{R}$.
6. (10 points) Exercise 4.10 (Prove equation (4.5) in the notes).
7. (10 points) Exercise 5.14 (Computing $\mathbf{T}(x)^m$ where each entry in the matrix $\mathbf{T}$ is a bounded degree polynomial).