

Test 2

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- **Please submit a pdf with your answers on blackboard by Thursday 23rd of January at 13:00. Please state name, surname and CID.**

Use the handouts to reply to these questions. Do not use generative AI tools. Note that each answer is in the handouts (and the CVXPY ones on the cvxpy website)

You cannot answer using screenshots. You need to reply by typing or in your own writing. This promotes subconscious retention.

This is an individual test. You cannot collaborate with other students or any other individual. This must be your work.

You should be able to complete this in 1 page. Do not write, nor spend too much time on this.

1. (2 points) Define a randomized detector and a deterministic detector.
2. Define the detection probability matrix.
3. Define a convex combination and use it to define a convex set.
4. Make a sketch of a convex set with exactly two corners (this is not in the handouts, think).
5. (3 points) Explain the difference between an affine set, a convex set and a conic set
6. Prove that the positive semidefinite cone is a convex cone using the definition of convex cone (as done in the video of Section 3.3).
7. Prove that the positive semidefinite cone is convex using the intersection property (as done in Section 3.4).

Appendix. With respect to previous years I removed 3 questions to make this test faster to complete.