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11. Problem sheet for **Statistical Data Analysis**

Exercise 1 (8 points)
Suppose that X is σ-subgaussian and X_1 and X_2 are independent and σ_1 and σ_2-subgaussian, respectively, then:

- $\mathbb{E}[X] = 0$ and $\mathbb{V}[X] \leq \sigma^2$.
- cX is $|c|\sigma$-subgaussian for all $c \in \mathbb{R}$
- $X_1 + X_2$ is $\sqrt{\sigma_1^2 + \sigma_2^2}$-subgaussian

(Hint: use Taylor expansion).

Exercise 2 (8 points)
Implement the Thompson sampling algorithm for $K = 6$ Bernoulli arms (Rewards 1 or 0) with $\mu_1 = 0.3$, $\mu_2 = 0.5$, $\mu_3 = 0.4$, $\mu_4 = 0.45$, $\mu_5 = 0.3$ and $\mu_6 = 0.35$. Run the algorithm for $T = 1000$ rounds and compute the average reward of running the algorithm 30 times.

 Due on the 23.01.2023 before midnight