1^{st} practice sheet Experimental Design

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1. Consider the linear model $y_i = \beta_0 + \beta_1 x_i + \varepsilon_i$ where we use the least square estimator $\hat{\beta}_{LS}$. A D-optimal experimental design tries to position the measurement locations x_i such that the variance-covariance matrix of the parameter estimates is minimal, i.e. $|\mathsf{Cov}(\hat{\beta})|$ is minimal.

   Let $[-1; 1]$ be the design region for the x-values and $n = 10$ the sample size. What is the D-optimal design for the above linear model?