Lemma 11.34 Let $\mathbf{Y}^* \sim \mathcal{N}(0, K)$ and $\mathbf{Y}$ be any random vector with correlation matrix K. Then

$$\int f_{\mathbf{Y}^*}(\mathbf{y}) \log f_{\mathbf{Y}^*}(\mathbf{y}) d\mathbf{y} = \int_{\mathcal{S}_{\mathbf{Y}}} f_{\mathbf{Y}}(\mathbf{y}) \log f_{\mathbf{Y}^*}(\mathbf{y}) d\mathbf{y}.$$