Homework 11 郑祖彬 12112328

6. Let $Y = AX$, $f_Y(\vec{y}) = \frac{1}{|\det(A)|} f_X(A^{-1}\vec{y})$

$$h(AX) = -\int f_Y(\vec{y}) \log f_Y(\vec{y})\, d\vec{y} = -\int \frac{1}{|\det(A)|} f_X(A^{-1}\vec{y}) \left[\log \frac{1}{|\det(A)|} + \log f_X(A^{-1}\vec{y})\right] d\vec{y}$$

$$= -\int f_X(\vec{x}) \log f_X(\vec{x})\, d\vec{x} - \int f_X(\vec{x}) \log \frac{1}{|\det(A)|}\, d\vec{x}$$

$$= h(X) + \log|\det(A)| \int f_X(\vec{x})\, d\vec{x}$$

$$= h(X) + \log|\det(A)|.$$