1.32 Using 1.27,

$$p(\mathbf{y}) = p(\mathbf{x}) \left| \frac{d\mathbf{x}}{d\mathbf{y}} \right|$$

$$= p(\mathbf{x}) \left| \frac{d(\mathbf{x})}{d(\mathbf{A}\mathbf{x})} \right|$$

$$= p(\mathbf{x}) \left| \frac{1}{det(\mathbf{A})} \right| \qquad Source$$

$$= |det(\mathbf{A})|^{-1} p(\mathbf{x})$$

Entropy of $\mathbf{y}$ is given by:

$$\mathbf{H}[\mathbf{y}] = -\int p(\mathbf{y}) \ln p(\mathbf{y})\, d\mathbf{y}$$

Since $p(\mathbf{y})\, d\mathbf{y} = p(\mathbf{x})\, d\mathbf{x}$, this becomes:

$$= -\int p(\mathbf{x}) \ln \left(|det(\mathbf{A})|^{-1} p(\mathbf{x}) \right)\, d\mathbf{x}$$

$$= -\int p(\mathbf{x}) \ln(|det(\mathbf{A})|^{-1})\, d\mathbf{x} - \int p(\mathbf{x}) \ln p(\mathbf{x})\, d\mathbf{x}$$

$$= \int p(\mathbf{x}) \ln |det(\mathbf{A})|\, d\mathbf{x} + \mathbf{H}[\mathbf{x}]$$

$$= \ln |det(\mathbf{A})| \int p(\mathbf{x})\, d\mathbf{x} + \mathbf{H}[\mathbf{x}]$$

$$= \ln |det(\mathbf{A})| (1) + \mathbf{H}[\mathbf{x}]$$

$$= \mathbf{H}[\mathbf{x}] + \ln |det(\mathbf{A})|$$