1.40 ln is a concave function, so $-\ln$ is a convex function.

Applying $-\ln$ to the formula for Jensen's inequality, we get:

$$-\ln\left(\sum_{i=1}^{M}\lambda_i x_i\right) \leq \sum_{i=1}^{M}\lambda_i(-\ln(x_i))$$

$$\implies \ln\left(\sum_{i=1}^{M}\lambda_i x_i\right) \geq \sum_{i=1}^{M}\lambda_i \ln(x_i)$$

Let $\lambda_i = (1/M)\,\forall\, i$

$$\implies \ln\left(\sum_{i=1}^{M}\frac{1}{M}x_i\right) \geq \sum_{i=1}^{M}\frac{1}{M}\ln(x_i)$$

$$\implies \ln\left(\sum_{i=1}^{M}\frac{1}{M}x_i\right) \geq \frac{1}{M}\sum_{i=1}^{M}\ln(x_i)$$

$$\implies \ln\left(\sum_{i=1}^{M}\frac{1}{M}x_i\right) \geq \frac{1}{M}\ln\left(\prod_{i=1}^{M}x_i\right)$$

$$\implies \ln\left(\sum_{i=1}^{M}\frac{1}{M}x_i\right) \geq \ln\left(\left(\prod_{i=1}^{M}x_i\right)^{1/M}\right)$$

$$\implies \sum_{i=1}^{M}\frac{1}{M}x_i \geq \left(\prod_{i=1}^{M}x_i\right)^{1/M}$$

$$\implies \frac{1}{M}\sum_{i=1}^{M}x_i \geq \left(\prod_{i=1}^{M}x_i\right)^{1/M}$$

$$\implies \text{Arithmetic mean} \geq \text{Geometric mean}$$