1. Let $\{x_1, \ldots, x_n\}$ be a set of positive numbers. We create a discrete distribution for a random variable X by placing weight $p_X(x_i) = 1/n$ on each of the numbers $x_1, \ldots, x_n$. Then the mean of X is the arithmetic mean (AM) given by

$$AM = E(X) = \sum_{i=1}^{n} x_i \, p_X(x_i) = \sum_{i=1}^{n} \frac{x_i}{n} = \frac{1}{n} \sum_{i=1}^{n} x_i.$$

The geometric mean of X is similar, except that it uses multiplication and a root in place of addition and division:

$$GM = \sqrt[n]{x_1 \, x_2 \cdots x_n} = (x_1 \, x_2 \cdots x_n)^{1/n}$$

Answer the following questions:

(a) **(2 points)** Using Jensen's inequality, argue that

$$\log\left[E(X)\right] \geq E\left[\log(X)\right].$$