Question-3

$y_i = a_j x_j \qquad 1 \leq j \leq n$

We are provided that a_j is

$$\log a_j = N(log\ a_0, \sigma^2)$$

PDF is given as

$$f(a_j) = \frac{1}{a_j \sigma\sqrt{2\pi}} \propto \left(\frac{-(\log a_j - \log\ a_0)^2}{2\sigma^2}\right)$$

To find the likelihood,

$$f(y|x) = \prod_{j=1}^{n} f(\log y_i |\ x_i)$$

Thus,

$$f(y|x) = \prod_{j=1}^{n} \frac{1}{\sigma\sqrt{2\pi}} \propto \left(\frac{-(\log y_j - \log\ a_0 - \log x_j)^2}{2\sigma^2}\right)$$