Suppose the quantity of cream obtained from a tin of milk is uniformly distributed with a mean of 10 kg and range of 1.8 kg. Then:

i.   What are the largest and the smallest amount of cream obtained from a tin of milk?

Solution:

The largest and the smallest amount of cream obtained from a tin of milk determined by mean and range. The Range is the difference between the lowest and highest values. Mean is $\frac{1}{2}(a+b)$ where a- the smallest amount and b- is the largest amount. So go get a and b, need to solve the system of equations:

$$\begin{cases} 10 = \dfrac{1}{2}(a+b) \\ 1.8 = b - a \end{cases}$$

Using the substitution method: $b = 1.8 + a$, then $10 = \frac{1}{2}(a + 1.8 + a)$ equal to $20 = 2a + 1.8$; $2a = 18.2$; $a = 9.1$; $b = 1.8 + 9.1 = 10.9$

Answer: The smallest amount cream obtained from a tin of milk is 9.1 and the largest amount is 10.9.

ii.   What is the probability that a tin of milk will give cream weighing between 9.2 kg and 10.8 kg?

Solution:

The probability that a tin of milk will give cream weighing between 9.2 kg and 10.8 kg determined by definite integral:

$$P(X \in [x1, x2]) = \int_{x1}^{x2} \frac{dy}{b-a}$$

Where: x1=9.2; x2=10.8; a and b is smallest and largest amount cream obtained from a tin of milk b=10.8 and a=9.2.

Calculating definite integral:

$$P(X \in [9.2, 10.8]) = \int_{9.2}^{10.8} \frac{dy}{b-a} = \frac{y}{10.8 - 9.2}\Big|_{9.2}^{10.8} = \frac{10.8}{1.8} - \frac{9.2}{1.8} = \frac{1.6}{1.8} = \frac{8}{9}$$

Answer: Probability that a tin of milk will give cream weighing between 9.2 kg and 10.8 kg is $\frac{8}{9}$