The 4077^{th} Mobile Army Surgical Hospital is considering the purchase of a helicopter to transport critical patients. The **probability distribution** of X, the number of patient helicopter transports per month, is determined from a similarly-sized army hospital as given by the probability distribution below.

Number of Helicopter Transports per Month

X	0	1	2	3	4	5	6
$P(X)$	0.15	0.20	0.34	0.19	0.06	0.05	0.01

For all of the following problems, include **probability notation**, label values with the appropriate **symbol**, show your **work**, and include **units** wherever applicable.

1. **Verify** that this is a valid discrete probability distribution.

   $0 \leq P(x) \leq 1$ for all values of x

   $\sum P(x) = 0.15 + 0.20 + 0.34 + 0.19 + 0.06 + 0.05 + 0.01 = 1$

2. Find the probability that a helicopter will **not be used** at all to transport patients in a month.

   $P(X = 0) = 0.15$

3. Find the probability that a helicopter will be used **at least once** to transport critical patients.

   $P(X \geq 1) = 1 - P(X = 0) = 0.85$

4. Find the **expected number** of times a helicopter will be used to transport critical patients each month. Show your work using the appropriate formula. (Use your calculator to check your work.)

   $\mu_X = E(X) = 0(0.15) + 1(0.20) + 2(0.34) + 3(0.19) + 4(0.06) + 5(0.05) + 6(0.01) = 2$ transports

5. **Interpret** the expected value in context of the problem.

   If we observed the number of helicopter transports for a large sample of months, we would expect the average number of transports per month to be 2 transports.

6. Find the **standard deviation** of the number of times a helicopter will be used to transport critical patients in a month. Show your work using the appropriate formula. (Use your calculator to check your work.)

   $\sigma_X^2 = \sum \left[(x - \mu_X)^2 \cdot P(x)\right] = (0-2)^2(0.15) + (1-2)^2(0.20) + \cdots + (6-2)^2(0.01) = 1.84 \text{ transports}^2$

   or $\sigma_X^2 = \sum \left[x^2 \cdot P(x)\right] - \mu_X^2 = 0^2(0.15) + 1^2(0.20) + \cdots + 6^2(0.01) - 2^2 = 1.84 \text{ transports}^2$

   $\sigma_X = \sqrt{1.84 \text{ transports}^2} = 1.36$ transports