Formulae: If X is a discrete random variable taking on values $x_1, x_2, \ldots, x_k$ with respective probabilities $p_1, p_2, \ldots, p_k$, then the mean is given by $\mu_X = \sum_{i=1}^{k} x_i \, p_i$, the variance by $\sigma_X^2 = \sum_{i=1}^{k} (x_i - \mu_X)^2 \, p_i$, and $\sigma_X = \sqrt{\sigma_X^2}$.

The number of contracts X received by a consultant during a randomly selected month is given by the probability distribution below:

Number of Contracts	0	1	2	3	4
Probability		0.20	0.30	0.20	0.15

1. (2 points) Find the probability that X is at most 3.

$$P(\text{at most } 3) = P(0) + P(1) + P(2) + P(3) = 1 - P(4) = 1 - 0.15 = 0.85$$

2. (3 points) Find μ_X, the mean of the probability distribution of X.

$$\mu_X = \sum x P(x) = 0(0.15) + 1(0.20) + 2(0.30) + 3(0.20) + 4(0.15) = 2.0$$

3. (5 points) Find σ_X, the standard deviation of the probability distribution of X.

x	$x - \mu$	$(x-\mu)^2$	$(x-\mu)^2 P(x)$
0	-2	4	0.6
1	-1	1	0.2
2	0	0	0
3	1	1	0.2
4	2	4	0.6
			Total: 1.6

Therefore, $\sigma_X^2 = 1.6$ so that $\sigma_X = \sqrt{1.6} = 1.26491$.