Which of the following is a valid discrete probability distribution?

(A)

x	–10	–9	–8	–7	–6	–5	–4	–3	–2	–1
$P(x)$	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1

(B)

x	–2	1	2	4
$P(x)$	0.2	0.6	0.2	0.1

(C)

x	1	2	3
$P(x)$	0.3	0.2	0.1

(D)

x	1	2	3	4
$P(x)$	0.1	0.2	0.3	–0.1

(E)

x	–2	–1	1	2
$P(x)$	–0.3	–0.2	0.2	0.3

Answer: A

So what do we mean by discrete?

Formulas

We define discrete random variables much the way we did with word problems in algebra

X = an outcome in a sample space

Example: X = # of wins in an NFL season $0 \leq X \leq 17$

$P(X)$ = probability of X occurring

Example: $P(12)$ = probability of 12 wins

Expected Value is just the predicted Mean when we have probabilities rather than collected data

$$E(X) = \mu_X = \sum x_i p_i$$

$$Var(X) = \sigma_X^2 = \sum (x_i - \mu_X)^2 p_i$$

More on these formulas soon. You can crunch these stats on your calculator, using your lists.

Remember that Standard Deviation = $\sqrt{\text{Variance}}$

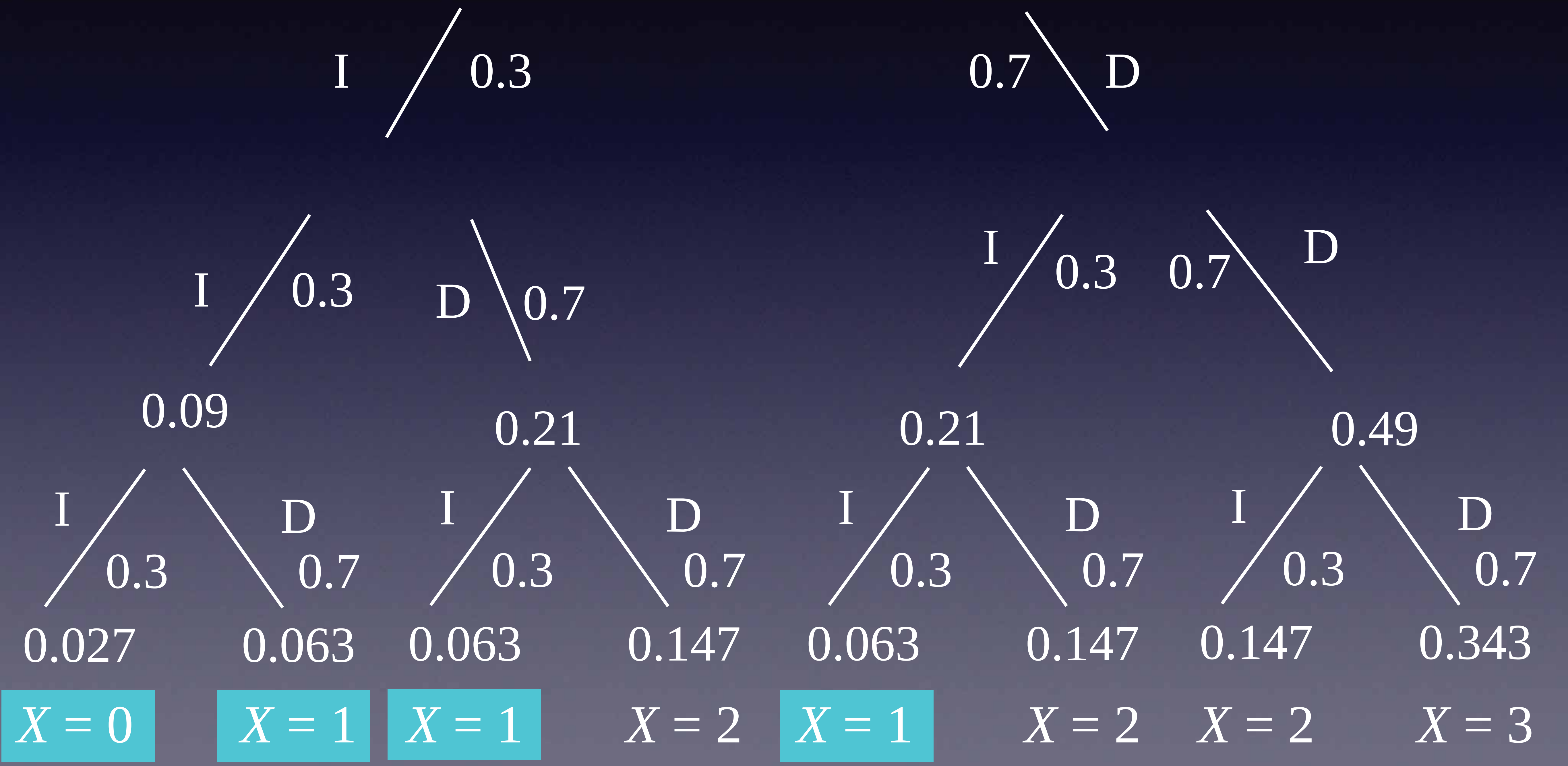
$$\sigma_X = \sqrt{\sigma_X{}^2}$$

Remember also that

$$\sum x_i p_i = x_1 p_1 + x_2 p_2 + x_3 p_3 + \ldots$$

1. Of all airline flight requests received by a certain discount ticket broker, 70% are for domestic travel (D) and 30% are for international flights (I). Let X be the number of requests among the next three requests received that are for domestic flights. Assuming independence of successive requests, determine the probability distribution of X. (Hint: One possible outcome is DID, with the probability .) What is the probability that there are fewer than 2 requests for domestic flights?

$X < 2$



1. Of all airline flight requests received by a certain discount ticket broker, 70% are for domestic travel (D) and 30% are for international flights (I). Let *X* be the number of requests among the next three requests received that are for domestic flights. Assuming independence of successive requests, determine the probability distribution of *X*. (Hint: One possible outcome is DID, with the probability .) What is the probability that there are fewer than 2 requests for domestic flights?

$$P(X=1)=0.063+0.063+0.063=0.189$$

$$P(X=2)=0.147+0.147+0.147=0.441$$

X	0	1	2	3
P(X)	0.027	0.189	0.441	0.343

$$P(X<2)=P(X=0)+P(X=1)$$
$$=0.027+0.189$$
$$=0.216$$

1. Of all airline flight requests received by a certain discount ticket broker, 70% are for domestic travel (D) and 30% are for international flights (I). Let *X* be the number of requests among the next three requests received that are for domestic flights. Assuming independence of successive requests, determine the probability distribution of *X*. (Hint: One possible outcome is DID, with the probability .) What is the probability that there are fewer than 2 requests for domestic flights?

What is the expected number of domestic flight requests?

X	0	1	2	3
P(*X*)	0.027	0.189	0.441	0.343

$$E(X) = \sum X \cdot P(X) = 0(.027) + 1(.189) + 2(.441) + 3(.343) =$$

2.1 requests

1. Companies proved to have violated pollution laws are being fined various amounts with the following probabilities:

Fine ($):	1000	10,000	50,000	100,000
Probability:	.4	.3	.2	.1

What are the mean and standard deviation for the fine variable?

(a) $\mu_x = 40,250, \sigma_x = 39,118$
(b) $\mu_x = 40,250, \sigma_x = 45,169$
(c) $\mu_x = 23,400, \sigma_x = 31,350$
(d) $\mu_x = 23,400, \sigma_x = 45,169$
(e) $\mu_x = 23,400, \sigma_x = 85,185$

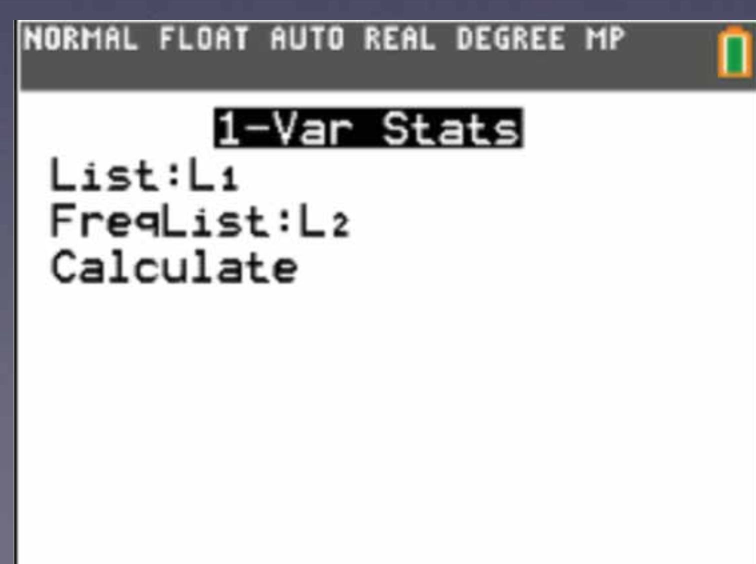
Answer: C

In other words, we want

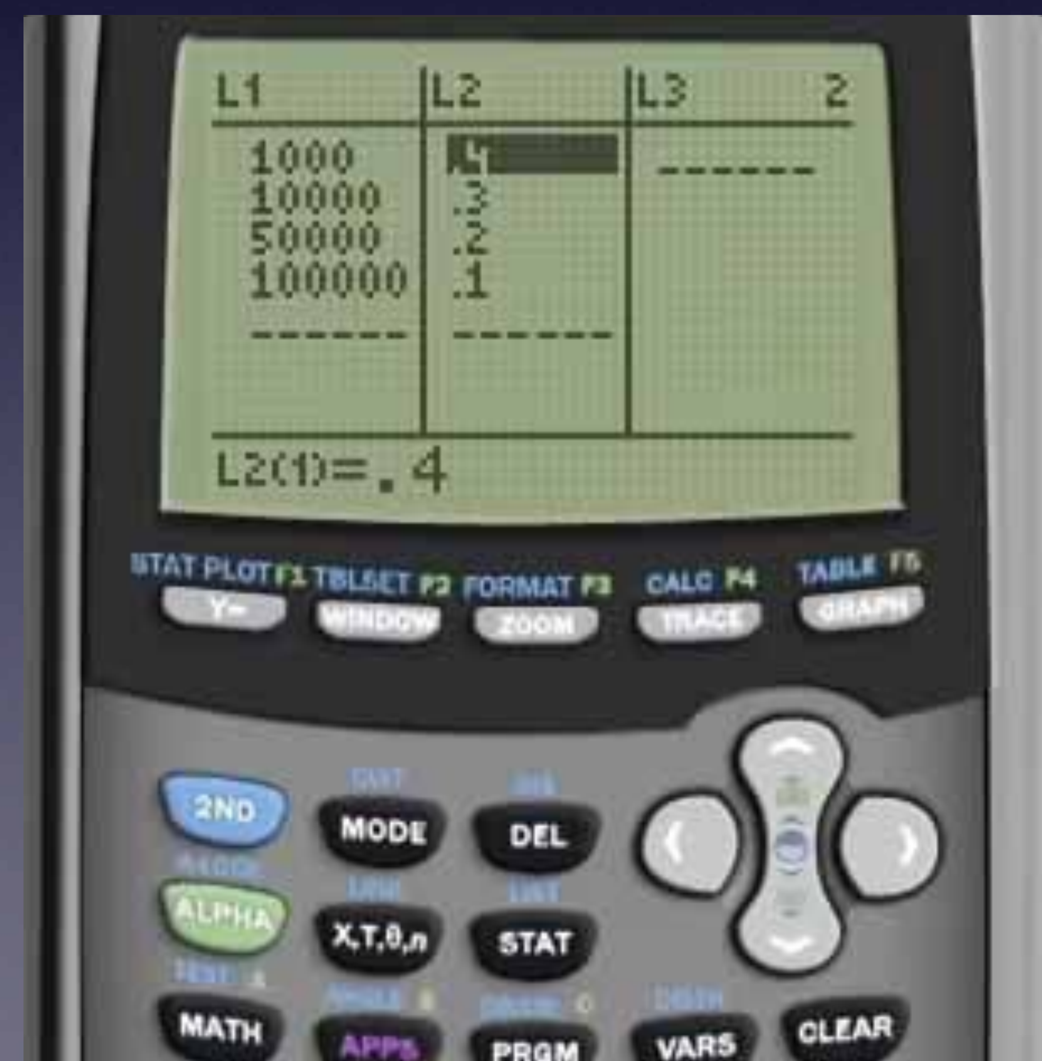
$$E(X) = \mu_X = \sum x_i p_i$$

$$\sigma_X = \sqrt{\sum (x_i - \mu_X)^2 p_i}$$

On the newer calculators, 1-Var Stats takes you to this window



Here's a shortcut to doing this on the calculator



2. At a warehouse sale 100 customers are invited to choose one of 100 identical boxes. Five boxes contain $700 color television sets, 25 boxes contain $540 camcorders, and the remaining boxes contain $260 cameras. What should a customer be willing to pay to participate in the sale?

(a)$260
(b)$352
(c)$500
(d)$540
(e)$699

X = $ a customer pays

$E(X)$ = $ a customer should expect to pay

Or the average amount paid per customer in this case

Answer: B

$$E(X) = \mu_X = 700\left(\frac{1}{20}\right) + 540\left(\frac{1}{4}\right) + 260\left(\frac{7}{10}\right) = \$352$$