AP Statistics Quiz C – Chapter 16 *Name* _____

A small business just leased a new computer and color laser printer for three years. The service contract for the computer offers unlimited repairs for a fee of $100 a year plus a $25 service charge for each repair needed. The company's research suggested that during a given year 86% of these computers needed no repairs, 9% needed to be repaired once, 4% twice, 1% three times, and none required more than three repairs.

1. Find the expected number of repairs this kind of computer is expected to need each year. Show your work.

2. Find the standard deviation of the number of repairs each year.

3. What are the mean and standard deviation of the company's annual expense for the service contract?

4. How many times should the company expect to have to get this computer repaired over the three-year term of the lease?

5. What is the standard deviation of the number of repairs that may be required during the three-year lease period? On what assumption does your calculation rest? Do you think this assumption is reasonable? Explain.

6. The service contract for the printer estimates a mean annual cost of $120 with standard deviation of $30. What is the expected value and standard deviation of the total cost for the service contracts on computer and printer?

7. [illegible]

Solution

let X = # of repairs in a year

a)

x	0	1	2	3
$P(x)$	.86	.09	.04	.01

→ put into L_1

→ put in L_2

1var stats on L_1 using L_2 as Frequency

$\mu_x = E(x)$ = Mean of x = .2 repairs/year

$\sigma_x = SD(x)$ = standard deviation of x = .548 repairs/year

b) Let Y = annual cost $= 100 + 25x$

$E(Y) = E(100 + 25x) = 100 + E(25x) = 100 + 25E(x) =$

$100 + 25(.2) = \$105$

$\sigma(Y) = \sigma(100 + 25x) = 25\sigma(x) = 25(.545) = \$13.69$

* σ is not affected by adding

c) $E(x_1 + x_2 + x_3) = E(x_1) + E(x_2) + E(x_3) = .2 + .2 + .2 = .6$

d) $\sigma(x_1 + x_2 + x_3) = \sqrt{(\sigma_x)^2 + (\sigma_x)^2 + (\sigma_x)^2} = \sqrt{(.548^2)(3)} = .9486$ point

Assume Independent

e) $E(Y + Z)$ (computer cost, printer cost) $= E(Y) + E(Z) = 105 + 120 = \$225$

$\sigma(Y + Z) = \sqrt{13.69^2 + 30^2} = \$32.95$

f) $E(Y - Z) = -15$ "printer by \$15

$\sigma(Y - Z) = \$32.95$