1) Suppose that the weight of a candy bar has a mean of 4 ounces with a standard deviation of 0.15 ounces. Also, the King size version of the candy bar has a weight of 7.5 ounces with a SD of 0.4 ounces. Assuming both distributions are approximately normal, what is the probability that a randomly selected King size bar weighs more than 2 randomly selected regular bars?

$Pr(K > R_1 + R_2) = Pr(K - 2R > 0)$

$E(K - 2R) = E(K) - (E(R_1) + E(R_2)) = 7.5 - (4+4) = -.5$

normalcdf(1.19, 100) = 13.5%

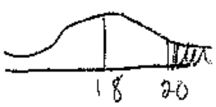
$\sigma(K - (R_1 + R_2)) = \sqrt{.4^2 + .15^2 + .15^2} = .45$

2) A company manufactures small stereo systems. At the end of the production line, the stereos are packaged and prepared for shipping. Stage 1 of this process is called "packing" (collecting all the components, putting everything in plastic bags, etc.). Stage 2 of this process is called "boxing" (arranging everything in the box, sealing the box, labeling it, etc.). The company says that times required for packing are approximately normally distributed with a mean of 9 minutes and a SD of 1.5 minutes. The times for boxing are also approximately normal, with a mean of 6 minutes and a SD of 1 minute.

a. What is the probability that "packing" two consecutive systems takes over 20 minutes?

$E(P_1 + P_2) = E(P_1) + E(P_2) = 9 + 9 = 18$ minutes

$\sigma(P_1 + P_2) = \sqrt{\sigma_{P_1}^2 + \sigma_{P_2}^2} = \sqrt{1.5^2 + 1.5^2} = 2.12$



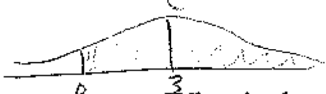
normalcdf$\left(\frac{20-18}{2.12}, 100\right)$ = 17.3%

b. What percentage of the stereo systems take longer to "pack" than to "box"?

Prob(Pack > Box) = Prob(Pack − Box > 0)

E(Pack − Box) = 9 − 6 = 3

$\sigma(\text{Pack} - \text{Box}) = \sqrt{\sigma_P^2 + \sigma_B^2} = 1.80$

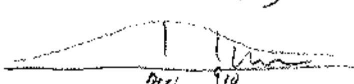


normalcdf$\left(\frac{-3}{1.803}, 100\right)$ = 95.2%

c. What is the probability that the average time it takes to "pack" 100 stereos is more than 9.1 minutes?

For the average to be 9.1 then the sum of the 100 stereos needs to be 910 minutes ... So $E(x_1 + x_2 + x_3 + \dots x_{100}) = 9(100) = 900$

$\sigma(x_1 + x_2 + \dots x_{100}) = \sqrt{1.5^2 + 1.5^2 + \dots} = \sqrt{1.5^2(100)} = 15$



normalcdf(.67, 100) = 25.143%

d. In both parts (a)-(c), what assumption did you make to answer the questions? Is this a reasonable assumption for these questions?

That the pack times are independent of one-another

And the Box times are independent of Pack times.

AP Statistics Quiz – 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. X = # of Repairs

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

$\mu_X = .2$

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

$\sigma_X = .548$

3. What are the mean and standard deviation of the company's annual expense for the service contract? 100 a year plus 25 for each repair

Y = cost per year of computer

$E(Y) = 100 + 25E(X) = 100 + 25(.2) =$ $E(Y) = 105$

$\sigma(100 + 25X) = 25\sigma(X) = 25(.548)$ $\sigma(Y) = 13.70$

10

4. How many times should the company expect to have to get this computer repaired over the three-year term of the lease? $E(X_1 + X_2 + X_3) = .2 + .2 + .2$

$.6$

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.

$\sqrt{.548^2(3)} = .949$

If each year is independent of the next which may not be reasonable...

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?

Z = cost per year of printer

$E(Y + Z) = 105 + 120 =$

$\sigma_Z = \sigma(Y+Z) = \sqrt{13.7^2 + 30^2}$

μ_Z 225

σ_Z 32.98

7. Which service contract should the company expect to cost more each year? How much more? With what standard deviation?

Printer $15 more

S.D = 32.98

$E(\text{Printer} - \text{Comp}) = 120 - 105 = 15$ printer

$\sigma(\text{printer} - \text{comp}) = 32.98$

?