Module 3 – Lesson 2

6.63 As a birthday gift, you are mailing a new personal digital assistant (PDA) to your cousin in Toledo. The PDA cost $250. There is a 2 percent chance it will be lost or damaged in the mail. Is it worth $4 to insure the mailing? Explain, using the concept of expected value.

Ans - Expected Loss = 250 * 0.02 = 5

Expected Loss = 5 > 4

Therefore, $4 is worth of sending insurance.

6.66 There is a 14 percent chance that a Noodles & Company customer will order bread with the meal. Use Excel to find the probability that in a sample of 10 customers,

(a) more than five will order bread;

(b) no more than two will;

(c) none of the 10 will order bread.

(d) Is the distribution skewed left or right?

Ans - (a) P(X>5)=BINOM.DIST.RANGE(10,0.14,6,10)=0.000950482

(b) P(X<=2)=BINOM.DIST.RANGE(10,0.14,0,2)=0.845470175

(c) P(X=0)=BINOM.DIST.RANGE(10,0.14,0,0)=0.221301579

(d) Given that P(x) = 0.14 is less than 0.5, the distribution exhibits a rightward skew.

6.68 The probability that an American CEO can transact business in a foreign language is .20. Ten American CEOs are chosen at random.

(a) What is the probability that none can transact business in a foreign language?

(b) That at least two can?

(c) That all 10 can?

Ans (a) P(X=0) = BINOM.DIST.RANGE(10,0.2,0,0)=0.107374182

(b) P(X>=2) = BINOM.DIST.RANGE(10,0.2,2,10)=0.624190362

(c) P(X=10) = BINOM.DIST.RANGE(10,0.2,10,10) =1.024E-07

6.73 The default rate on government-guaranteed student loans at a certain private 4-year institution is 7 percent. The college extends 10 such loans.

(a) What is the probability that none of them will default?

(b) That at least three will default?

(c) What is the expected number of defaults?

Ans - (a) P(X=0) = BINOM.DIST.RANGE(10,0.07,0,0)=0.483982307

(b) P(X>=3) = BINOM.DIST.RANGE(10,0.2,3,10)=0.028342146

(c) expected number of defaults = 0.07 * 10 = 0.7

6.77 A small feeder airline knows that the probability is .10 that a reservation holder will not show up for its daily 7:15 a.m. flight into a hub airport. The flight carries 10 passengers.

(a) If the flight is fully booked, what is the probability that all those with reservations will show up?

(b) If the airline overbooks by selling 11 seats, what is the probability that no one will have to be bumped?

(c) That more than one passenger will be bumped?

(d) The airline wants to overbook the flight by enough seats to ensure a 95 percent chance that the flight will be full, even if some passengers may be bumped. How many seats would it sell?

Ans - (a) P(10 of 10 show up) =BINOM.DIST.RANGE(10,0.1,0,0)=0.34867844

(b) P(<=10 of 11 show up)=BINOM.DIST.RANGE(11,0.1,1,10)=0.686189404

(c) The aircraft can only accommodate 10 passengers altogether; more than one passenger cannot be bumped. Therefore, P(bump more than one passenger) = 0.

(d) It is necessary to sell 13 seats in order to guarantee a minimum of 95% of the flight being filled.

6.86 Car security alarms go off at a mean rate of 3.8 per hour in a large Costco parking lot. Find the probability that in an hour there will be

(a) no alarms

(b) fewer than four alarms

(c) more than five alarms.

Ans (a) P(X=0) = 0.022370772

(b) P(X<4) = 0.473484843

(c) P(X>5) = 0.184443744

6.91 On New York's Verrazano Narrows bridge, traffic accidents occur at a mean rate of 2.0 crashes per day. Let X be the number of crashes in a given day.

(a) Justify the use of the Poisson model.

(b) What is the probability of at least one crash?

(c) Fewer than five crashes?

Ans (a) Because traffic accidents are independent and random, they conform to the Poisson distribution.

(b) P(X>=1) =1 - POISSON.DIST(0,2,1) = 0.864664717

(c) P(X<5)=POISSON.DIST(4,2,1)=0.052653017

6.105 The weight of a Los Angeles Lakers basketball player averages 233.1 pounds with a standard deviation of 34.95 pounds. To express these measurements in terms a European would understand, we could convert from pounds to kilograms by multiplying by .4536.

(a) In kilograms, what is the mean?

(b) In kilograms, what is the standard deviation?

Ans Mean in kilograms = 233.1*0.4536 = 105.73416 kg

Standard deviation in kilograms = 34.95*0.4536 = 15.85332 kg

6.106 The Rejuvo Corp. manufactures granite countertop cleaner and polish. Quarterly sales Q is a random variable with a mean of 25,000 bottles and a standard deviation of 2,000 bottles. Variable cost is $8 per unit, and fixed cost is $150,000.

(a) Find the mean and standard deviation of Rejuvo's total cost.

(b) If all bottles are sold, what would the selling price have to be to break even, on average? To make a profit of $20,000?

Ans (a) Mean cost = 150000 + 8*25000 = 350000

Standard deviation = 2000*8 = 16000

(b) We have P*25000 = 8 * 25000 + 150000 => P = 14 as our price to break even.

$20000 P1 is our price to turn a profit; P1 * 25000 = 8 * 25000 + 150000 + 20000 => P1 = 14.8