DECS Sample Diagnostic Solutions

(this version: 5-20-2012)

1a) 0.2 + 0.3 – 0.1 = 0.4

1b) No, because P(A ∩ B) is not the same as P(A)\*P(B)

1c) 1/3

2a) 1/3

2b) 45/91

2c) 78/159

3a) 0.85

3b) 0.9

4a) BINOMDIST(3,5,0.5, FALSE)

4b) 1- (0.5)^5

4c) 2.5

4d) 5/4

5a) 0.9\*0.9\*0.9\*0.1

5b) BINOMDIST(3,20,0.1, TRUE) - BINOMDIST(0,20,0.1, TRUE)

6a) The formula in Excel for confidence interval of the true mean is 14.5 +- (8.2/sqrt(225))\*tdist(.2,224,2) = [14.04,14.96]

6b) The test statistic is t = (15.5-14.5) / (8.2/sqrt(225)) = 1.83

The p-value is tdist(1.82,224,1)=.035 > .02 so the answer is NO, we cannot prove the hypothesis (cannot reject the null that average was more than 15.5.)

7a) 303\*150 = 45450

7b) 300000 = 8193 + 303 (area), therefore Area = (300000-8193)/303=963 sq ft

8a) Either BINOMDIST(120, 200, 0.75, TRUE) or BINOMDIST(119, 200, 0.75, TRUE) is acceptable.

8b) Either 1 – BINOMDIST(119, 200, 0.5, TRUE) or 1 – BINOMDIST(120, 200, 0.5, TRUE) is acceptable.

9) If T is total profit then the expected value of T is $40,000. The standard deviation of T is 45,600. By the CLT, T will be approximately normally distributed (since it is the sum of independent random variables). Then, Pr(T > 0) will be

 1- NORMDIST(0, 40,000, 45,600, TRUE) = 0.8.

10a) If no info, expected payoff of investing is 0.1.

If acquire info, then will invest if receive signal g (this happens with probability 0.515) and expected payoff (ignoring cost of info) will be 0.39.

If signal is b, then expected payoff from investing (ignoring cost of info) will be -0.2. So, if receive signal b, investor 1 will not invest.

Expected payoff from buying info is 0.515 \* 0.38 + 0.485 \* (-0.01) = 0.19.

So, using info adds value, and investor 1 will buy info. If g, then invest, otherwise not.

10b) Investor 2 can deduce that investor 1 received signal g. Knowing this, Investor 2 assigns probability 0.69 to state being S. Since this is above 0.5, he will invest in the absence of any other information.

Could getting extra information be a benefit? If he pays and gets signal g (i.e., two g's in a row), his estimate of the probability of S can only increase, so he would invest.

What if he gets signal b? From the relevant table or probability tree we see that now investor 2 would assign probability 0.55 to S. In other words, it went down but is still above 0.5. So, investor 2 will still invest.

Since information does not change his decision, the value of the info is zero. He would not pay for it.

10c) Investor 2 does not buy information and invests regardless, and so investor 3 learns nothing from investor 2. So, he is in the same position as investor 2 was. Investor 3 also does not acquire information.