7.5 Notes – Conditional Probability

* Conditional probability is the probability of an event occurring given that another event has already occurred.

Notation: P(B|A) is read “probability of B occurring given A has occurred”

Formula: P(B|A) = =

* Product Rule: P(A ∩ B) = P(B|A) ∙ P(A)

Note: Formulas are useful, but use reasoning as well. Don’t depend entirely on the formulas!

* Two events are independent if the outcome of one does not affect the outcome of the other. Test for independence: Two events A and B are independent if and only if P(A ∩ B) = P(A) ∙ P(B).

Example 1: Two marbles are drawn without replacement from a jar that contains 5 blue marbles and 3 red marbles. Find the probability that

1. The first marble is blue.
2. The second marble is blue if the 1st marble is blue.
3. The second marble is blue if the 1st one is not blue.

Venn diagram:

Example 2: In a box of 20 size AA batteries, 10 are brand X and 10 are brand Y. You also know that 3 of the brand X batteries are dead, while 2 of the brand Y are dead. Find each probability if X = event of drawing a brand X battery, Y = event of drawing a brand Y battery, and D = event of drawing a dead battery.

1. P(X)
2. P(D|X)
3. P(D ∩ X)
4. P(D)

Venn Diagram: Revisit the above using the diagram and formulas.

HW: 7.5 Exercises (p. 424) #2, 6 – 14 evens, 22 – 28 evens, 32, 38, 42