Definition 1.1 – Mean of a sample

$$\bar{y} = \frac{1}{n}\sum_{i=1}^{n} y_i$$

Definition 1.2 - Variance

$$s^2 = \frac{1}{n-1}\sum_{i=1}^{n}(y_i - \bar{y})^2$$

Definition 1.3 – Standard Deviation

$$s = \sqrt{s^2}$$
$$\sigma = \sqrt{\sigma^2}$$

Definition 2.7 - Permutations

$$P_r^n = \frac{n!}{(n-r)!}$$

Definition 2.8 – Combinations

$$\binom{n}{r} = C_r^n = \frac{n!}{r!\,(n-r)!}$$

Definition 2.9 – Conditional Probability

$$P(A|B) = \frac{P(A \cap B)}{P(B)}$$

Definition 2.10 – Independence & Dependence

Two events ***A*** and ***B*** are said to be *independent* if:

$$P(A|B) = P(A)$$
$$P(B|A) = P(B)$$
$$P(A \cap B) = P(A)P(B)$$

Otherwise, they are *dependent*.

Definition 2.11 – Law of Total Probability

For some positive integer *k*, let the sets B_1, B_2, ..., B_k be such that

1. $S = B_1 \cup B_2 \cup \ldots \cup B_k$
2. $B_i \cap B_j = \emptyset,$ for $i \neq j$

Then the collection of sets $\{B_1, B_2, \ldots, B_k\}$ is said to be a partition of *S*

Definition 3.4 – Expected Value of a Discrete Random Variable

$$E(Y) = \sum_y yp(y) = \mu$$

Definition 3.5 – Variance and Standard Deviation of a Discrete Random Variable

$$V(Y) = E[(Y-\mu)^2]$$
$$SD = \sqrt{V(Y)}$$

Definition 3.7 – Binomial Distribution

$$p(y) = \binom{n}{y} p^y q^{n-y}, \qquad \mathrm{y} = 0, 1, 2, \dots, n \text{ and } 0 \le \mathrm{p} \le 1$$

Definition 3.8 – Geometric Probability

$$p(y) = q^{y-1}p, \qquad \mathrm{y} = 1, 2, 3, \dots, 0 \le \mathrm{p} \le 1$$