Probability
Reference Sheet

n Factorial (n!)
$n! = n * (n-1) * (n-2) * ... * 3 * 2 * 1$
Ex. $4! = 4 * 3 * 2 * 1 = 24$

Permutations
$P(n,k) = \frac{n!}{(n-k)!}$

Combinations
$C(n,k) = \frac{n!}{k!(n-k)!}$

Probability of an Event Occuring
$P(E) = \frac{n(E)}{s(E)}$
$n(E)$ = number of elements in event E
$s(E)$ = total elements in sample space s

Odds in favor of an event given Probability
Given probability of an event occurring equal to $\frac{a}{b}$
Odds = a to $b-a$

Probability of event occurring given odds
Given odds of event E occurring equal to a to b
$P(E) = \frac{a}{a+b}$

Probability of Mutually Exclusive Events
$P(AorB) = P(A) + P(B)$
Where A and B are mutually exclusive events

Probability of two events
$P(AorB) = P(A) + P(B) - P(AandB)$
Where A and B are *not* mutually exclusive events

Probability of the Compliments of an Event
$P(E^c) = 1 - P(E)$

Conditional Probability
$P(B|A) = \frac{P(AandB)}{P(A)}$
Probability that B occurs given that A occurs

Expectation
$P(S_1) * S_1 + P(S_2) * S_2 + P(S_3) * S_3 + ... + P(S_n) * S_n$
Where $S_1, S_2, S_3, ..., S_n$ are possible outcomes of an experiment, and $P(S_1), P(S_2), P(S_3), ...P(S_n)$ are the probabilities of those events occurring