1 Commonly Used Distributions

Distribution	PDF	Support	Mean	Variance
Binomial	$p(y) = \binom{n}{y} p^y (1-p)^{n-y}$	y = 0, 1, . . . , n	np	$np(1-p)$
Geometric	$p(y) = p(1-p)^{y-1}$	y = 1, 2, . . .	$\frac{1}{p}$	$\frac{1-p}{p^2}$
Poisson	$p(y) = \frac{\lambda^y e^{-\lambda}}{y!}$	y = 0, 1, 2, . . .	λ	λ
Uniform	$f(y) = \frac{1}{\theta_2 - \theta_1}$	$\theta_1 \leq y \leq \theta_2$	$\frac{\theta_1+\theta_2}{2}$	$\frac{(\theta_2-\theta_1)^2}{12}$
Gaussian	$f(y) = \frac{1}{\sigma\sqrt{2\pi}} e^{\frac{-(y-\mu)^2}{2\sigma^2}}$	$y \in \mathbb{R}$	μ	σ^2
Exponential	$f(y) = \frac{1}{\beta} e^{-y/\beta}$	$y > 0$	β	β^2
Gamma	$f(y) = \frac{y^{\alpha-1} e^{-y/\beta}}{\Gamma(\alpha)\beta^\alpha}$	$y > 0$	$\alpha\beta$	$\alpha\beta^2$
Beta	$f(y) = \left[\frac{\Gamma(\alpha+\beta)}{\Gamma(\alpha)\Gamma(\beta)}\right] y^{\alpha-1}(1-y)^{\beta-1}$	$0 < y < 1$	$\frac{\alpha}{\alpha+\beta}$	$\frac{\alpha\beta}{(\alpha+\beta)^2(\alpha+\beta+1)}$

2 R Syntax & Elementary Functions

- Variable assignment, either `<-` or `=`
- And Operator: `&`
- Or Operator: `|`
- Initialize a vector: `x <- c()`
- Addition: `+`
- Subtraction: `-`
- Multiplication: `*`
- Division: `/`
- Exponents: `^` or `**`
- Exponential: `exp()`
- Natural Logarithm: `log()`
- Simulate `n` variates from a standard Gaussian: `rnorm(n)`
- Simulate `n` variates from a Uniform(0, 1) distribution: `runif(n)`
- If statement demonstration:

```
if(something1){
    return(event1)
} else if (something2){
    return(event2)
} else {
    return(event3)
}
```