## Discrete Distributions

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Parameters</th>
<th>pmf</th>
<th>Mean</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Binomial</td>
<td>$n, \pi$</td>
<td>$\binom{n}{x} \pi^x (1 - \pi)^{n-x}$</td>
<td>$n\pi$</td>
<td>$n\pi (1 - \pi)$</td>
</tr>
<tr>
<td>Hypergeometric</td>
<td>$m, n, k$</td>
<td>$\frac{\binom{m}{k} \binom{n}{x}}{\binom{m+n}{k}}$</td>
<td>$k \left( \frac{m}{m+n} \right)$</td>
<td>$k \left( \frac{m + m - k}{n + m - 1} \right) \left( \frac{m}{m+n} \right) \left( \frac{n}{m+n} \right)$</td>
</tr>
</tbody>
</table>

## Continuous Distributions

<table>
<thead>
<tr>
<th>Distribution</th>
<th>Parameters</th>
<th>pdf</th>
<th>Mean</th>
<th>Variance</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uniform</td>
<td>$a, b$</td>
<td>$\frac{1}{b-a}$</td>
<td>$a + b$</td>
<td>$\frac{(b-a)^2}{12}$</td>
</tr>
<tr>
<td>Exponential</td>
<td>$\lambda$</td>
<td>$\lambda e^{-\lambda x}$</td>
<td>$1/\lambda$</td>
<td>$1/\lambda^2$</td>
</tr>
<tr>
<td>Normal</td>
<td>$\mu, \sigma$</td>
<td>$\frac{1}{\sqrt{2\pi} \sigma^2} e^{-(x-\mu)^2/(2\sigma^2)}$</td>
<td>$\mu$</td>
<td>$\sigma^2$</td>
</tr>
<tr>
<td>Weibull</td>
<td>$\alpha, \beta$</td>
<td>$\left( \frac{\alpha}{\beta} \right)^\alpha e^{-(x/\beta)^\alpha}$</td>
<td>$\beta \Gamma \left( 1 + \frac{1}{\alpha} \right)$</td>
<td>$\beta^2 \Gamma \left( 1 + \frac{2}{\alpha} \right) - \mu^2$</td>
</tr>
<tr>
<td>$t$</td>
<td>$\nu$</td>
<td>$\frac{1}{\sqrt{\nu\pi}} \frac{\Gamma(\nu+1/2)}{\Gamma(\nu/2)} \frac{1}{(1+\nu^2/\nu)^{(\nu+1)/2}}$</td>
<td>$0$</td>
<td>$\nu/(\nu - 2)$</td>
</tr>
<tr>
<td>chi square</td>
<td>$\nu$</td>
<td>$\frac{1}{2^\nu/2 \Gamma(\nu/2)} x^{\nu/2-1} e^{-x/2}$</td>
<td>$\nu$</td>
<td>$2\nu$</td>
</tr>
</tbody>
</table>

Note: the gamma function, $\Gamma(x)$ is defined by $\Gamma(x) = \int_0^\infty t^{x-1} e^{-t} dt$. For all $x > 1$, $\Gamma(x) = (x-1)\Gamma(x-1)$. Also, $\Gamma(0) = 1$. $\Gamma(x)$ is computed in R by `gamma(x)`.