MATH 3421: Formula Sheet

Bernoulli Bernoulli(θ) distribution

If $X|\theta \sim \text{Bernoulli}(\theta)$ then it has probability mass function

$$Pr(X = x|\theta) = \theta^x(1-\theta)^{1-x} \quad x = 0, 1, \quad 0 < \theta < 1.$$

Also, $\text{E}(X|\theta) = \theta$ and $\text{Var}(X|\theta) = \theta(1-\theta)$.

Gamma Gamma(α, β) distribution

If $X|\alpha, \beta \sim \text{Gamma}(\alpha, \beta)$, then it has probability density function

$$f(x|\alpha, \beta) = \frac{\beta^\alpha x^{\alpha-1}e^{-\beta x}}{\Gamma(\alpha)}, \quad x > 0, \quad \alpha > 0, \beta > 0.$$

Also, $\text{E}(X|\alpha, \beta) = \alpha/\beta$ and $\text{Var}(X|\alpha, \beta) = \alpha/\beta^2$.

Normal N(μ, σ^2) distribution

If $X|\mu, \sigma \sim \text{N}(\mu, \sigma^2)$, then it has probability density function

$$f(x|\mu, \sigma) = \frac{1}{\sqrt{2\pi\sigma^2}} \exp\left\{-\frac{(x-\mu)^2}{2\sigma^2}\right\}, \quad -\infty < x < \infty, \quad -\infty < \mu < \infty, \sigma > 0.$$

Also, $\text{E}(X|\mu, \sigma) = \mu$ and $\text{Var}(X|\mu, \sigma) = \sigma^2$.

Uniform U(a, b) distribution

If $X|a, b \sim \text{U}(a, b)$, then it has probability density function

$$f(x|a, b) = \frac{1}{b-a}, \quad a < x < b, \quad -\infty < a < b < \infty.$$

Also, $\text{E}(X|a, b) = (a+b)/2$ and $\text{Var}(X|a, b) = (b-a)^2/12$.