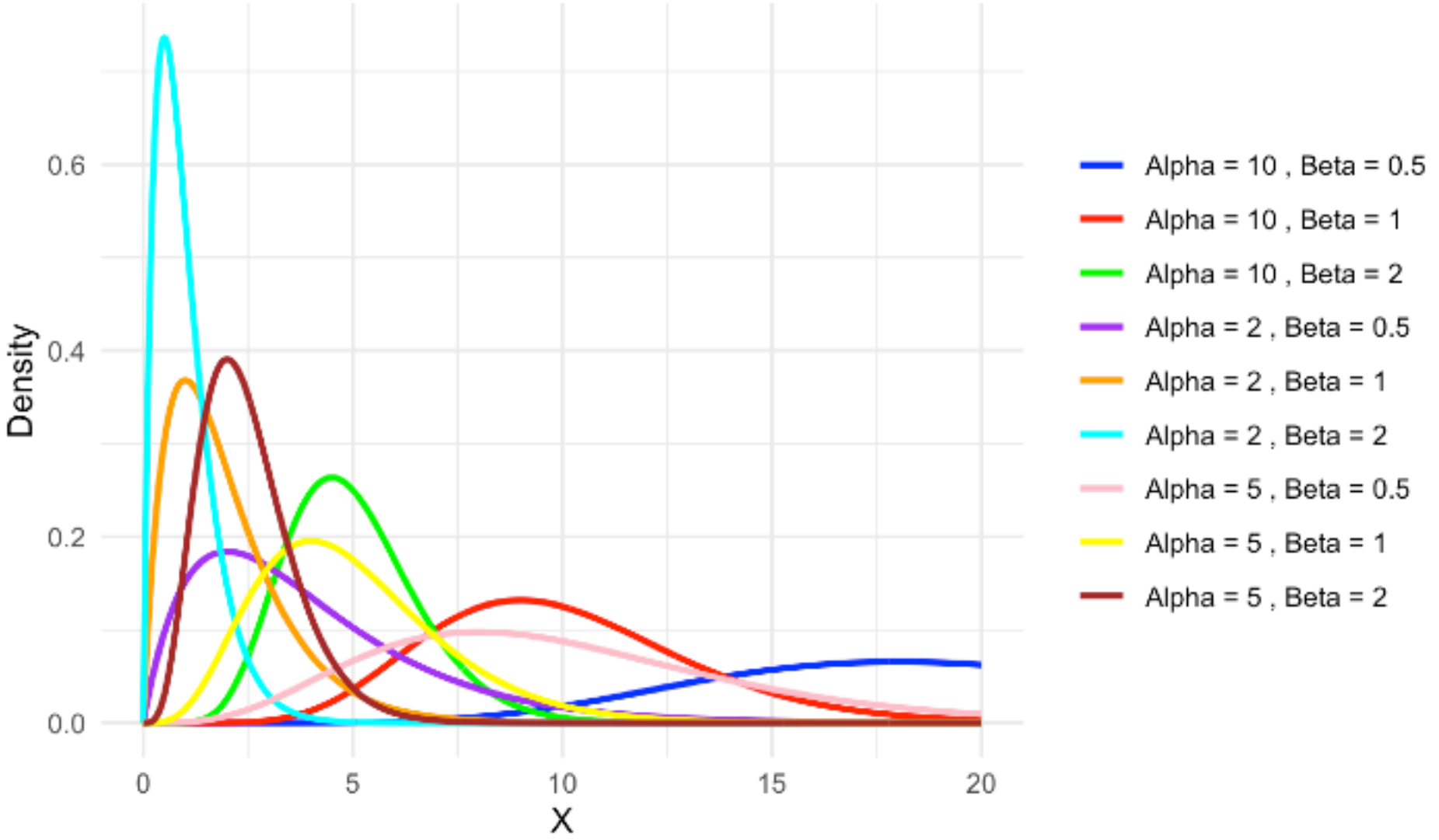
some continuous random variables and their pdfs

gamma distribution $X \sim \text{Gamma}(\alpha, \beta)$


Density
0.0
0.2
0.4
0.6
0
5
10
15
20
X
Alpha = 10 , Beta = 0.5
Alpha = 10 , Beta = 1
Alpha = 10 , Beta = 2
Alpha = 2 , Beta = 0.5
Alpha = 2 , Beta = 1
Alpha = 2 , Beta = 2
Alpha = 5 , Beta = 0.5
Alpha = 5 , Beta = 1
Alpha = 5 , Beta = 2

some continuous random variables and their pdfs

gamma distribution $X \sim \text{Gamma}(\alpha, \beta)$

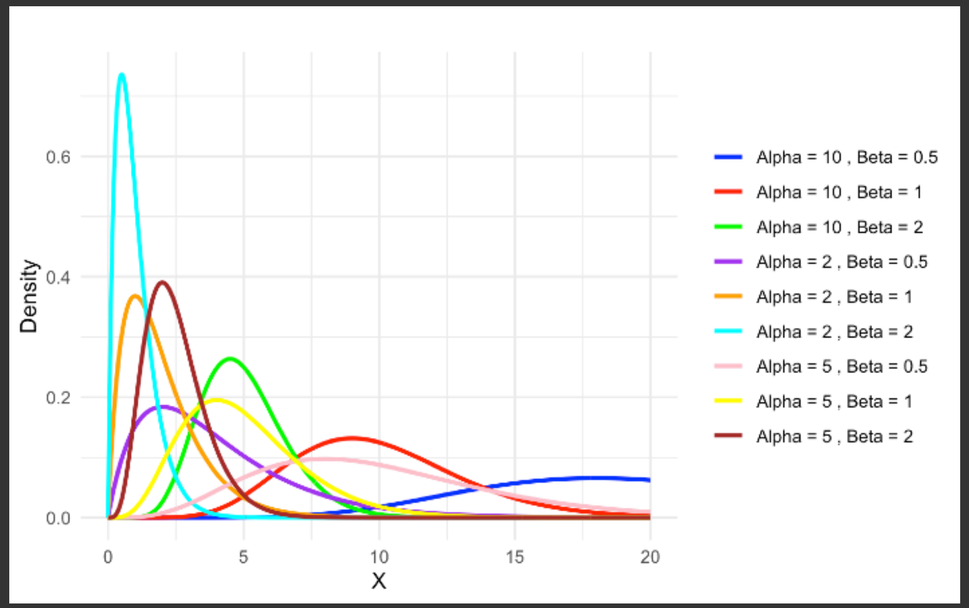
A continuous random variable X has Gamma distribution with parameters α and β (both positive) if

$$f(x) = \begin{cases} \frac{1}{\beta^{\alpha}\Gamma(\alpha)} x^{\alpha-1} e^{x/\beta} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$$

where $\Gamma(\alpha)$ is the gamma function

$$\Gamma(\alpha) = \int_0^{\infty} x^{\alpha-1} e^{-x} dx,$$

which cannot be expressed in closed form analytical solution.



$$\alpha = 1 \implies \text{Exponential} \left(\beta = \frac{1}{\lambda}\right)$$

$$\alpha = \frac{v}{2}, \beta = 2 \implies \text{chi-square} \quad \chi^2(v)$$

some continuous random variables and their pdfs

important distributions for statistical hypothesis tests

more on these in your tutorial this week...