Beta Distributions

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## Beta

We can use the base plot functions in R to create a plot of the pdf for a beta random variable $X$ with parameters $α$ and $β$. Note that R defines $α=$ **shape11** and $β=$ **shape12**.

 x <- seq(0, 1, by=0.001)
 plot(x, dbeta(x, shape1=0.5, shape2=0.5), lty=1, col=1, type="l", xlab="x", ylab="f(x)", ylim=c(0,3))
 lines(x, dbeta(x, shape1=1, shape2=0.5), lty=2, col=2)
 lines(x, dbeta(x, shape1=2, shape2=0.5), lty=3, col=3)
 lines(x, dbeta(x, shape1=0.5, shape2=1), lty=4, col=4)
 lines(x, dbeta(x, shape1=1, shape2=1), lty=5, col=5)
 lines(x, dbeta(x, shape1=2, shape2=1), lty=6, col=6)
 lines(x, dbeta(x, shape1=0.5, shape2=2), lty=7, col=7)
 lines(x, dbeta(x, shape1=1, shape2=2), lty=8, col=8)
 lines(x, dbeta(x, shape1=2, shape2=2), lty=9, col=9)



The CDF may be plotted analogously.

 x <- seq(0, 1, by=0.001)
 plot(x, pbeta(x, shape1=0.5, shape2=0.5), lty=1, col=1, type="l", xlab="x", ylab="F(x)")
 lines(x, pbeta(x, shape1=1, shape2=0.5), lty=2, col=2)
 lines(x, pbeta(x, shape1=2, shape2=0.5), lty=3, col=3)
 lines(x, pbeta(x, shape1=0.5, shape2=1), lty=4, col=4)
 lines(x, pbeta(x, shape1=1, shape2=1), lty=5, col=5)
 lines(x, pbeta(x, shape1=2, shape2=1), lty=6, col=6)
 lines(x, pbeta(x, shape1=0.5, shape2=2), lty=7, col=7)
 lines(x, pbeta(x, shape1=1, shape2=2), lty=8, col=8)
 lines(x, pbeta(x, shape1=2, shape2=2), lty=9, col=9)



### Uniform

The special case of the beta(1,1) is actually a U(0,1). Interesting, but not very helpful.

 x <- seq(0, 1, by=0.001)
 plot(x, dbeta(x, shape1=1, shape2=1), lty=2, col=2, type="l", xlab="x", ylab="f(x)", ylim=c(-0.1,1.1))
 lines(x, dunif(x, 0, 1), lty=3, col=3)



 plot(x, pbeta(x, shape1=1, shape2=1), lty=2, col=2, type="l", xlab="x", ylab="F(x)")
 lines(x, punif(x, 0, 1), lty=3, col=3)

