

# Problem Set 1

In this problem set, you will be asked to work with the gamma distribution. I recommend Wikipedia as a reference, [https://en.wikipedia.org/wiki/Gamma\\_distribution](https://en.wikipedia.org/wiki/Gamma_distribution). Keep your rendered `.pdf` to no more than 1 page.

1. Consider two sets of values for the shape parameter  $\alpha$  and rate parameter  $\lambda$ :  $(\alpha_1, \lambda_1) = (0.5, 0.5)$  and  $(\alpha_2, \lambda_2) = (2, 1)$ . Summarize the two sets of values in a  $2 \times 5$  table made using `kable`, with a row for each pair of values named “Choice 1” and “Choice 2,” one column for the  $\alpha$  values named “Shape,” one column for the  $\lambda$  values named “Rate,” one column for the corresponding mode named “Mode,” and one column for the corresponding mean named “Mean,” and one column for the corresponding variance named “Variance.”
2. Use either `curve` or `plot` to plot the densities corresponding to the two gamma distributions described in the previous part using the `dgamma` function. Use different colors and line types to distinguish the two choices. Make sure that your plot includes a legend, is legible, and is self contained.
3. Provide the equation for the CDF of the gamma function for general shape and rate parameters  $\alpha$  and  $\beta$ . You may find this reference helpful if you are new to typesetting math, specifically Greek letters: [https://en.wikibooks.org/wiki/LaTeX/Mathematics#Greek\\_letters](https://en.wikibooks.org/wiki/LaTeX/Mathematics#Greek_letters).