The parametric distribution: Definition

- **Definition:** A parametric distribution is a set of distribution functions where each of these distribution functions is fully specified through one or more (a **fixed and finite** number) parameters.
- All of the distributions in the Appendices A and B (in your tables) are parametric
- For individual examples, look at the problems we did so far in this course ...

The scale distribution: Definition

- **Definition:** A parametric distribution is a scale distribution if, when a random variable from that set of distributions is multiplied by a positive constant, the resulting random variable is also in that set of distributions.
- For instance, the Weibull distribution is a scale distribution
- Other examples are:

- exponential (see textbook),
- gamma (see textbook),
- normal (why?)

The scale distribution: Definition

- **Definition:** Let X be a random variable with nonnegative support which has a scale distribution.
  If a parameter of that scale distribution satisfies the following two conditions:

1. When a member of that scale distribution is multiplied by a positive constant, the scale parameter is multiplied by the **same** constant, while
2. all the other parameters remain the same,
   that parameter is called the scale parameter.

- For the exponential (we do have a scale parameter θ)
- For gamma (we again have a scale parameter θ)
- Weibull (again θ)
- For the lognormal we do not have a scale parameter (according to the parametrization used in the textbook) - although this is a scale distribution (why??)

Parametric distribution families

- **"Definition:"**
  A parametric distribution family is a set of parametric distributions that are related in some meaningful way.
- Most importantly, we can do the following:
- the set of parameters is finite - but we can decrease the exact number of parameters by setting some of them to be
- constant, e.g., exponential is a special type of gamma (how?)
- equal to each other, e.g., paralogistic is a special type of distribution from the transformed beta distribution family with $\tau = 1$ and $\alpha = \gamma$