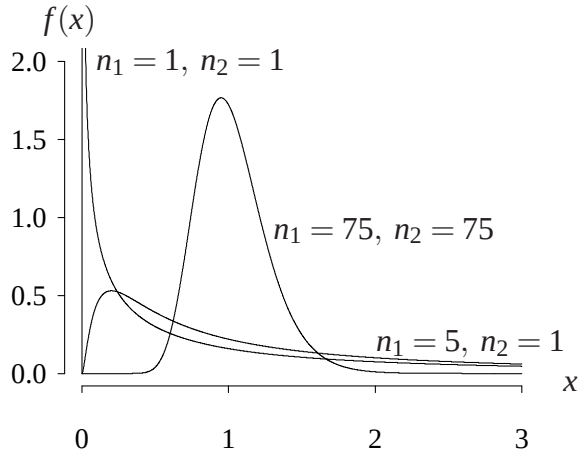
F distribution (from http://www.math.wm.edu/~leemis/chart/UDR/UDR.html)
The shorthand $X \sim F(n_1, n_2)$ is used to indicate that the random variable X has the F distribution with parameters n_1 and n_2, which are positive integers known as the degrees of freedom for the numerator and the degrees of freedom for the denominator. The F distribution is also known as the *variance ratio distribution* and the *Fisher–Snedecor distribution*. An F random variable X with n_1 and n_2 degrees of freedom has probability density function

$$f(x) = \frac{\Gamma((n_1+n_2)/2)(n_1/n_2)^{n_1/2}x^{n_1/2-1}}{\Gamma(n_1/2)\Gamma(n_2/2)[(n_1/n_2)x+1]^{(n_1+n_2)/2}} \qquad x > 0,$$

for $n_1 = 1, 2, \ldots$ and $n_2 = 1, 2, \ldots$. The F distribution is used for statistical inference concerning ratios of variances of two normal populations. The F distribution is used for statistical inference concerning ratios of rates of two exponential populations. The probability density function is plotted below for three parameter combinations: $n_1 = 1$ and $n_2 = 1$; $n_1 = 5$ and $n_2 = 1$; $n_1 = 75$ and $n_2 = 75$.



The cumulative distribution function, survivor function, hazard function, cumulative hazard function, inverse distribution function, median, moment generating function, and characteristic function can't be written as closed-form expressions. The mode of X is

$$\frac{n_2(n_1-2)}{n_1(n_2+2)} \qquad n_1 > 2.$$

The population mean, variance, skewness, and kurtosis of X are

$$E[X] = \frac{n_2}{n_2-2} \qquad n_2 > 2$$

$$V[X] = \frac{2n_2^2(n_1+n_2-2)}{n_1(n_2-2)^2(n_2-4)} \qquad n_2 > 4$$

$$E\left[\left(\frac{X-\mu}{\sigma}\right)^3\right] = \frac{(2n_1+n_2-2)\sqrt{8(n_2-4)}}{(n_2-6)\sqrt{n_1(n_1+n_2-2)}} \qquad n_2 > 6$$

$$E\left[\left(\frac{X-\mu}{\sigma}\right)^4\right] = \frac{3\,(n_2-4)\left(10n_1^2+n_1^2n_2-20n_1+8n_1n_2+n_1n_2^2+16-16n_2+4n_2^2\right)}{n_1\,(n_1+n_2-2)\,(n_2-6)\,(n_2-8)} \qquad n_2 > 8.$$

APPL verification: The APPL statements

```
X := FRV(n1, n2);
Mean(X);
Variance(X);
Skewness(X);
Kurtosis(X);
```

verify the population mean, variance, skewness, and kurtosis.