Some scribbles on the exponential distribution
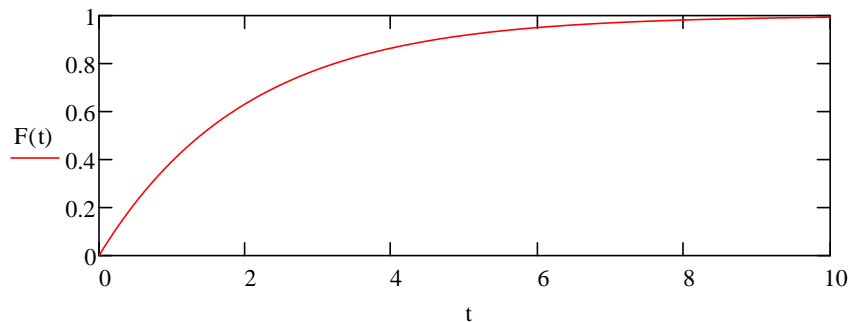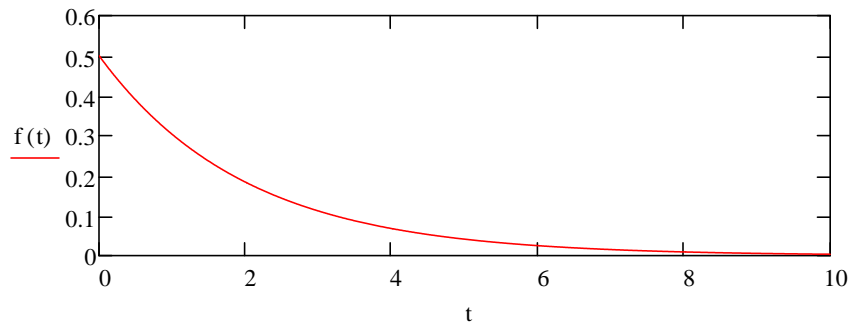
$\lambda := 0.5$ The rate parameter

$f(t) := \lambda \cdot e^{-\lambda \cdot t}$ pdf

$F(t) := 1 - e^{-\lambda \cdot t}$ CDF

$$\int_{0}^{\infty} t \cdot f(t)\, dt \to 2.0$$ The expected value (mean, average, first moment)

What is the probability that an arrival occurs before 5, 50, and 500 seconds?

$$\int_{0}^{5} f(t)\, dt = 0.918 \qquad F(5) = 0.918 \quad F(50) = 1 \quad F(500) = 1$$

What is the probability that an arrival occurs after 4 second but before 5 seconds?

$$\int_{4}^{5} f(t)\, dt = 0.053 \qquad F(5) - F(4) = 0.053$$

What is the probability that an arrival occurs after 3 seconds?

$$\int_{3}^{\infty} f(t)\, dt = 0.223 \qquad 1 - F(3) = 0.223$$

See also: http://en.wikipedia.org/wiki/Exponential_distribution