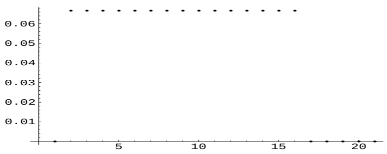
Math 464/564, O. Knill, **February 1997**

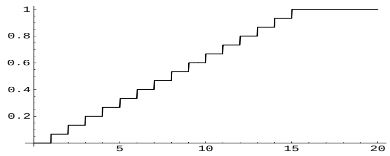
Discrete probability distributions

UNIFORM DISTRIBUTION. $\Omega = \{1, \dots, n\}$.

$$\boxed{\mathrm{P}[\{X(\omega) = k\}] = n^{-1}}$$

Equal districution on finite probability space.

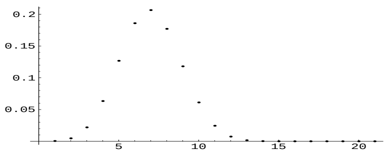


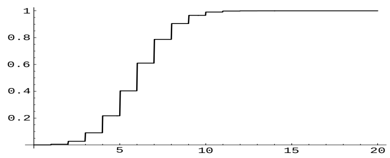


BERNOULLI DISTRIBUTION. $\Omega = \{0, \dots, n\}$.

$$\boxed{\mathrm{P}[\{X(\omega) = k\}] = \binom{n}{k} p^k (1-p)^{n-k}}$$

Make n experiments with success rate p. Have k times success.

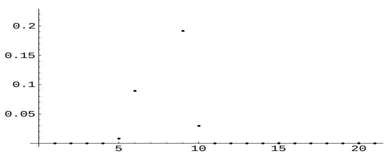


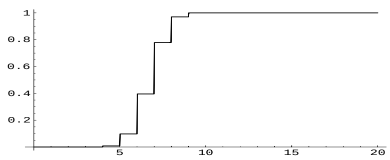


HYPERGEOMETRIC DISTRIBUTION. $\Omega = \{0, 1, \dots, n\}$.

$$\boxed{\mathrm{P}[\{X(\omega) = k\}] = \frac{\binom{r_1}{k} \cdot \binom{r - r_1}{n - k}}{\binom{r}{n}}}$$

Win k from n tries by choosing from r elements amoung which r_1 have winning property. (Lotto).

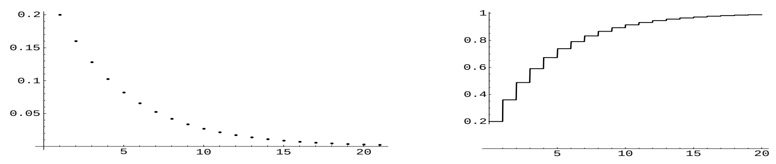




GEOMETRIC DISTRIBUTION. $\Omega = \{0, 1, 2, \dots, \} = \mathbb{N}$.

$$\boxed{\mathrm{P}[\{X(\omega) = k\}] = p(1-p)^k}$$

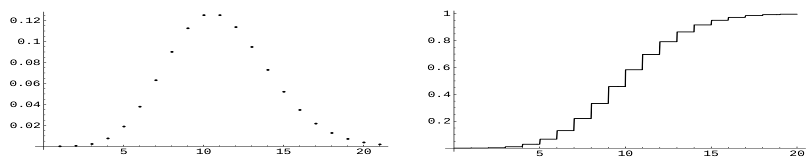
Waiting time for failing of equipment.



POISSON DISTRIBUTION. $\Omega = \{0, 1, 2, \dots, \} = \mathbb{N}$.

$$\boxed{\mathrm{P}[\{X(\omega) = k\}] = \frac{\lambda^k e^{-\lambda}}{k!}}$$

Used for counting pheneomena.



The illustrations for this page were done by running the following program.

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          DisplayFunction->Identity],
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          DisplayFunction->Identity,
          AxesOrigin->{0.0,0.0}] }],
      DisplayFunction->$DisplayFunction];

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Display["!psfix -land>dist03.ps",PDFandCDF[GeometricDistribution[0.2]]];
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