Lecture 16

Networks: Scale Free Networks
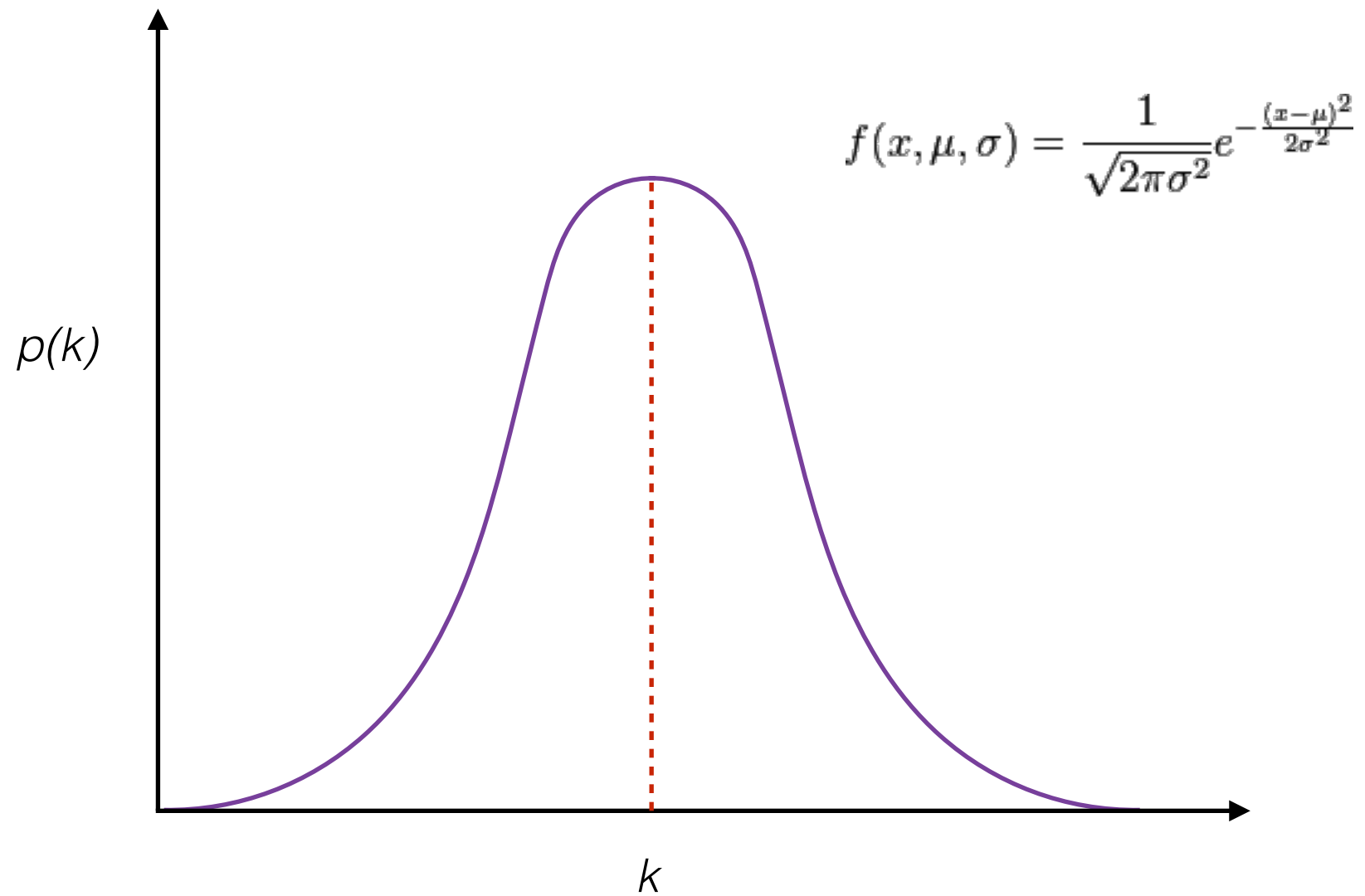
Normal Distribution

$$f(x, \mu, \sigma) = \frac{1}{\sqrt{2\pi\sigma^2}} e^{-\frac{(x-\mu)^2}{2\sigma^2}}$$

$p(k)$

k

Poisson Distribution

mean = 1

$$\Pr(X{=}k) = \frac{\lambda^k e^{-\lambda}}{k!},$$

$p(k)$

k

1   4   7   10   13

Poisson Distribution

mean = 1

$$\Pr(X{=}k) = \frac{\lambda^k e^{-\lambda}}{k!},$$

most nodes are poorly connected,
while a select minority of hubs are highly connected.

$p(k)$

k

1   4   7   10   13

Poisson Distribution

mean = 1

mean = 4

$$\Pr(X{=}k) = \frac{\lambda^k e^{-\lambda}}{k!},$$

$p(k)$

k

1   4   7   10   13

Poisson Distribution

mean = 1

mean = 4

mean = 7

$$\Pr(X{=}k) = \frac{\lambda^k e^{-\lambda}}{k!},$$

$p(k)$

k
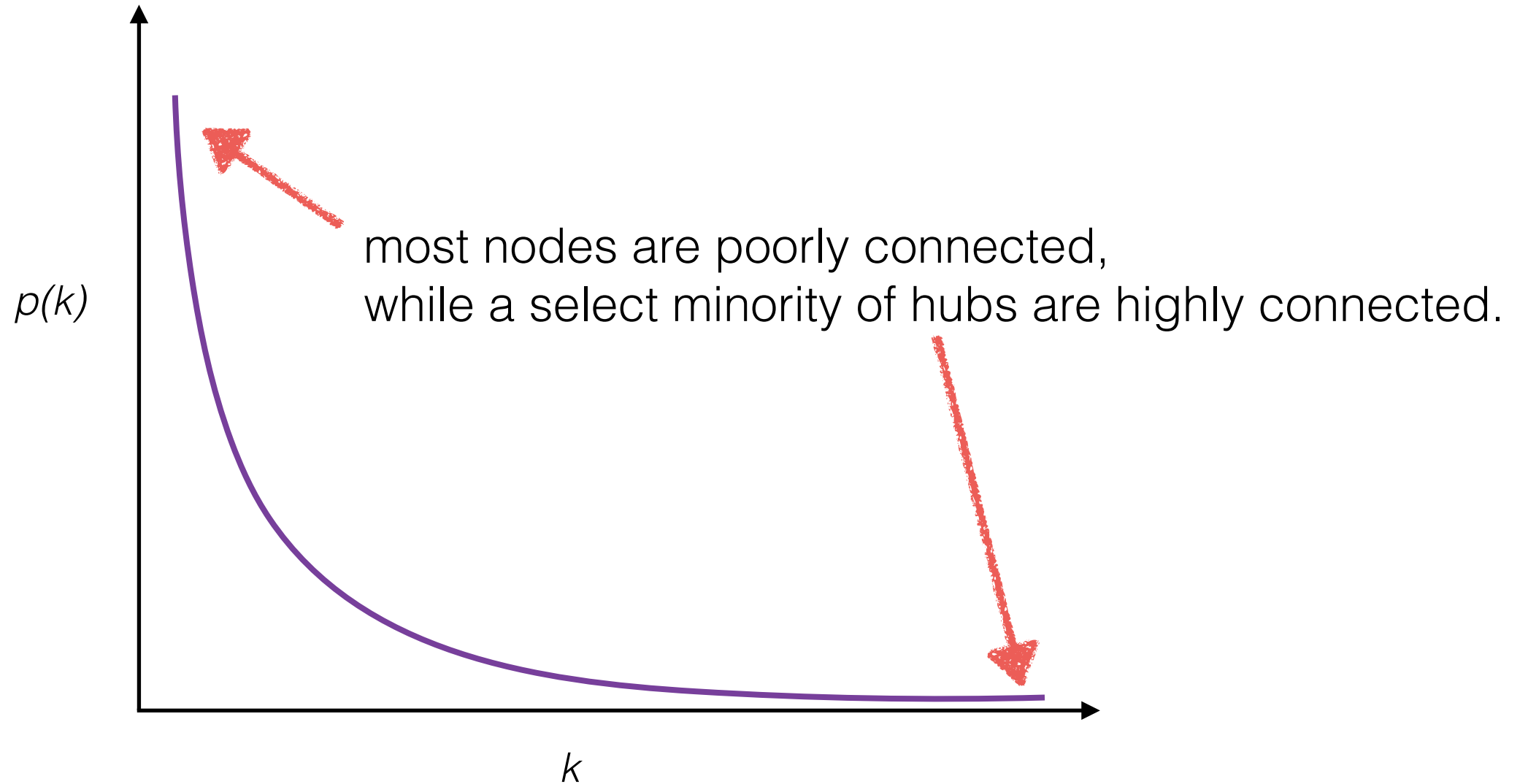
1   4   7   10   13
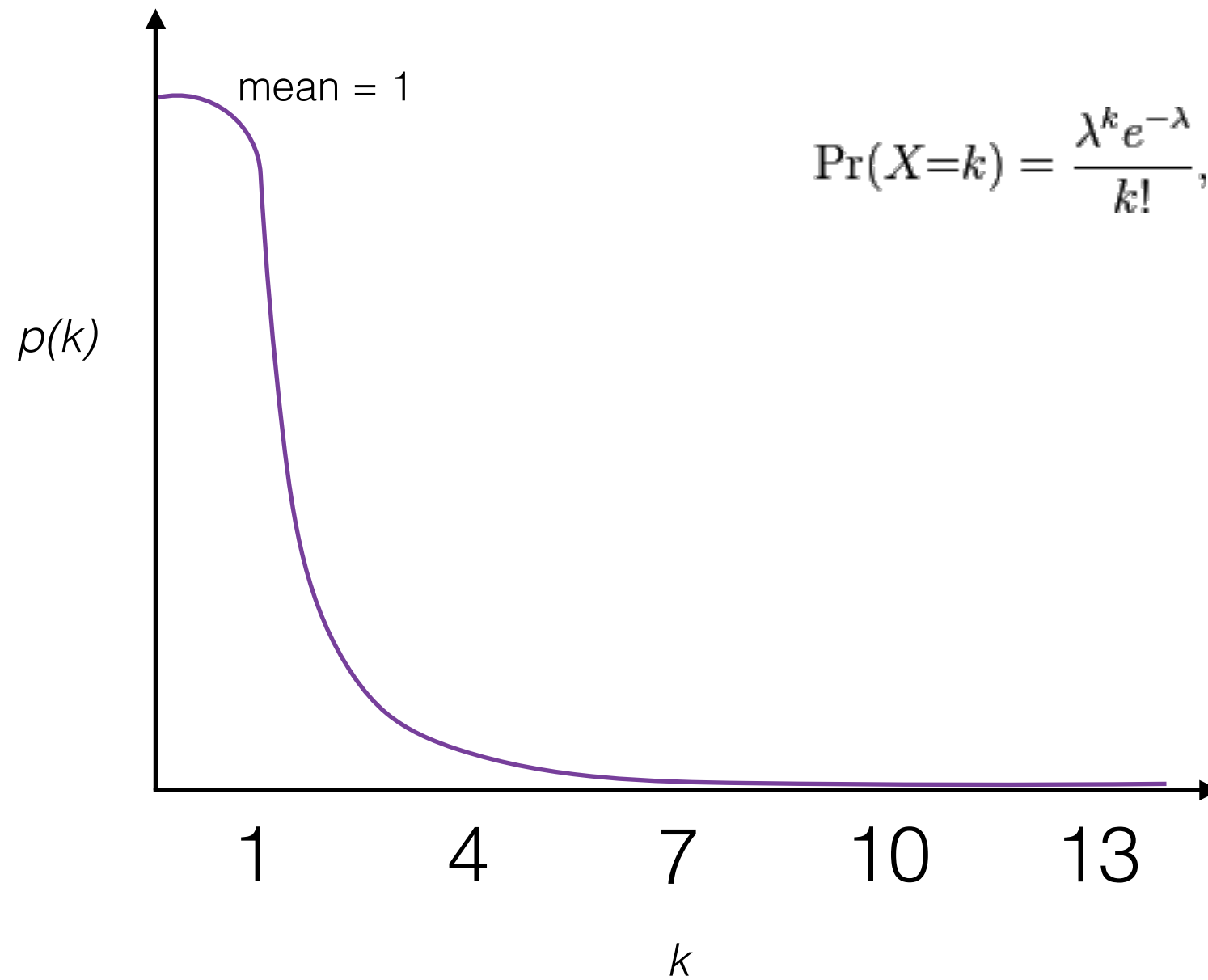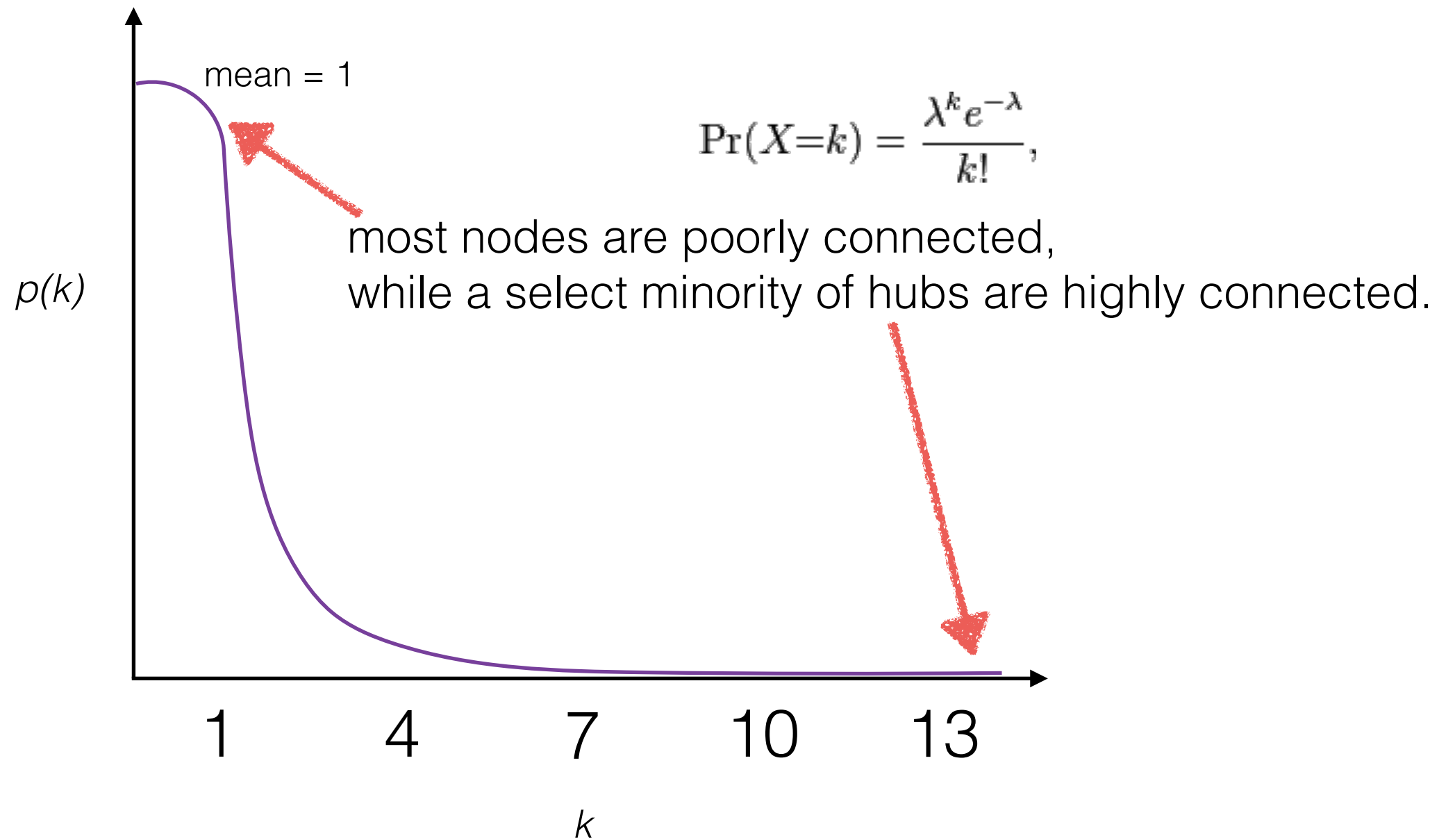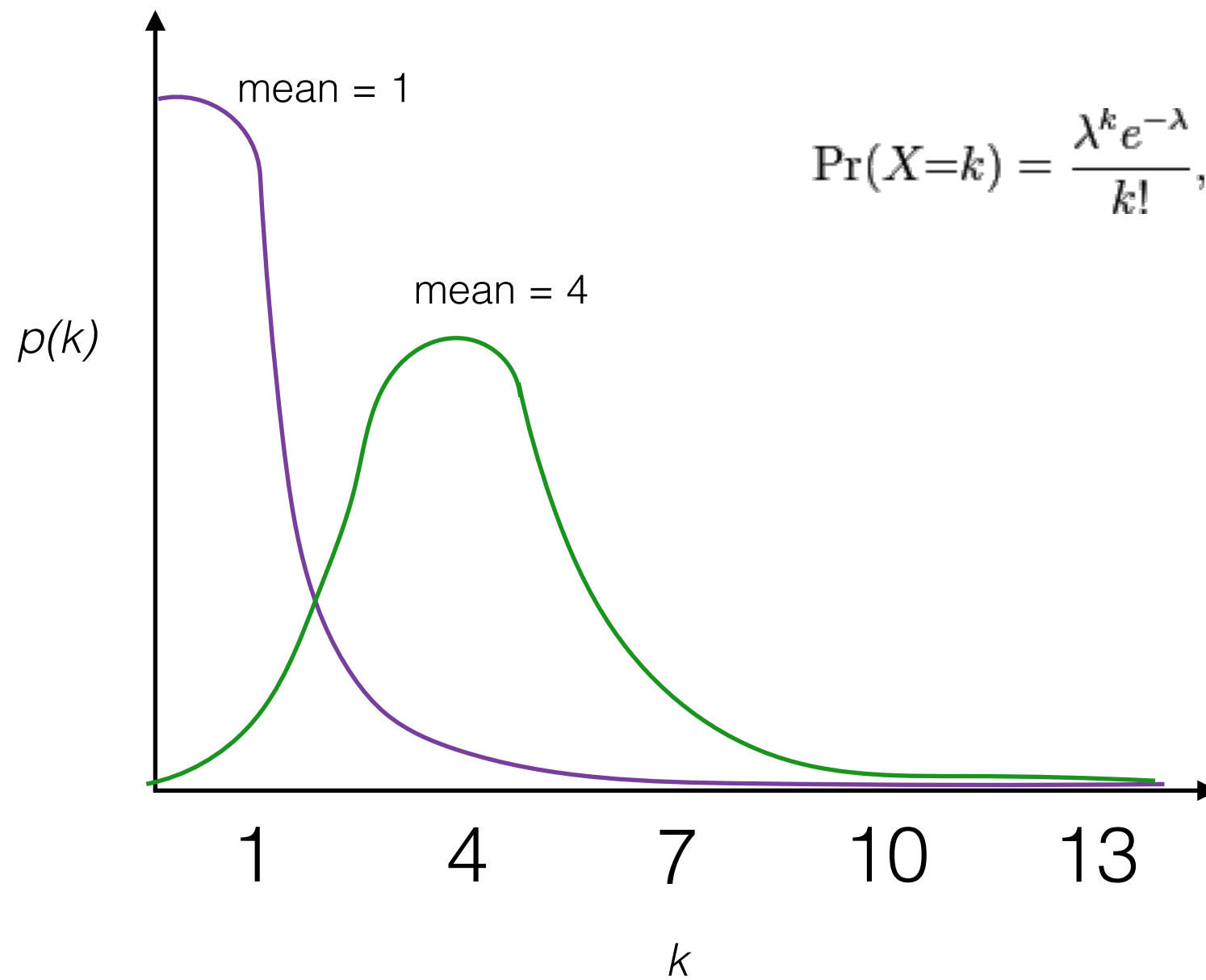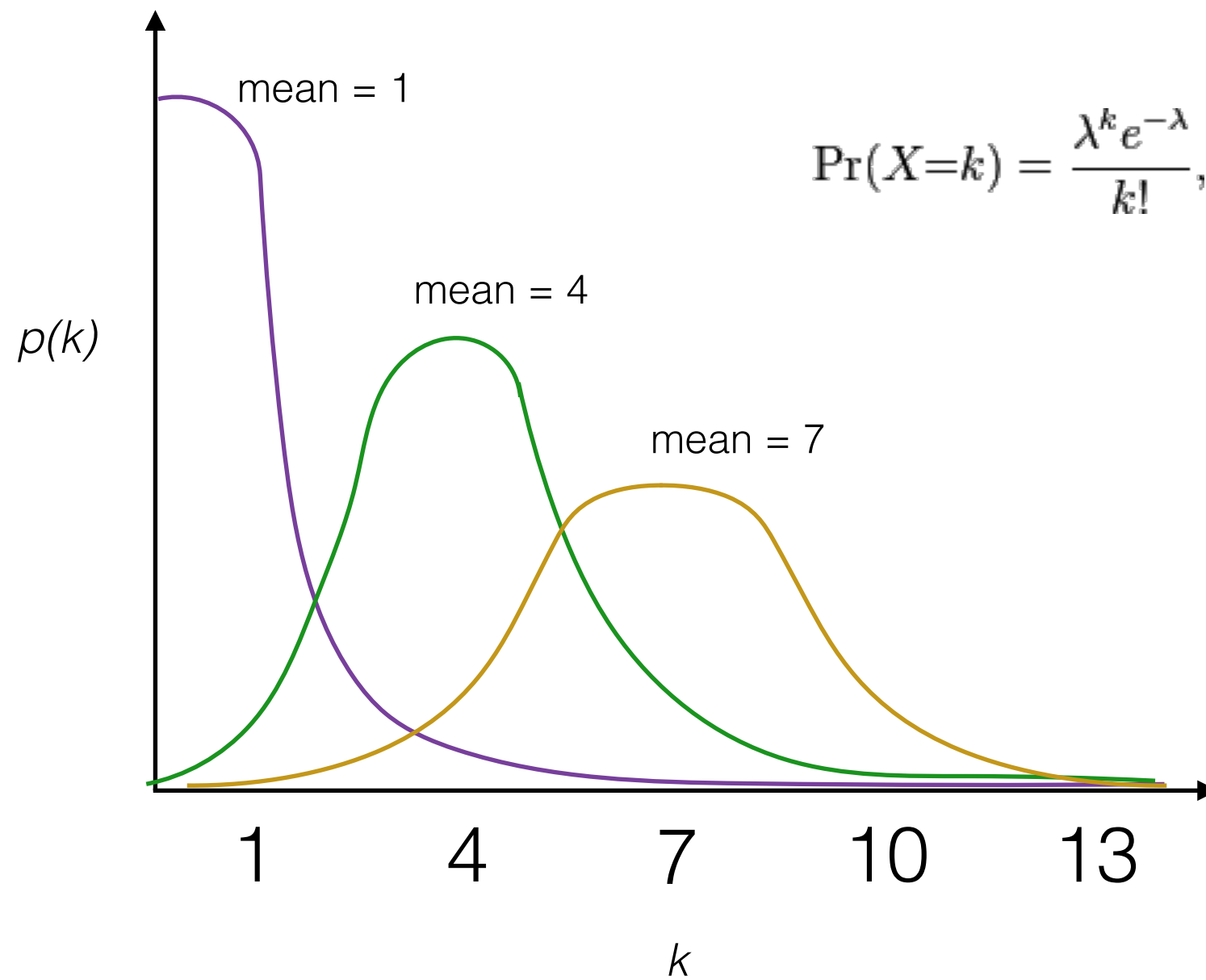
Poisson Distribution

limitation: the occurrence of a new relationship is considered independent of previous relationships.

Power Law Distribution

Power Law Distribution

$p(k)$

k

most nodes are poorly connected,
while a select minority of hubs are highly connected.

Preferential Attachment Model