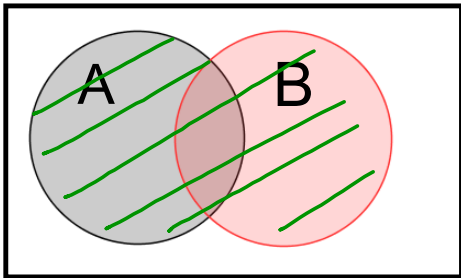


Sannsynlighetsregning

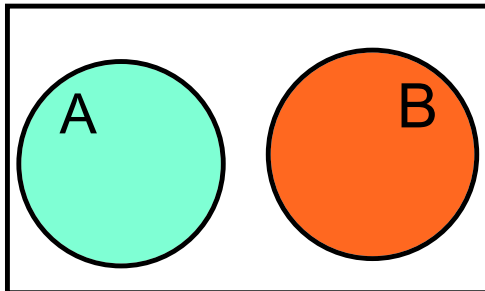


$$P[A \cup B] = P[A] + P[B] - P[A \cap B]$$

A + B

A eller B

Disjunkte hendelser

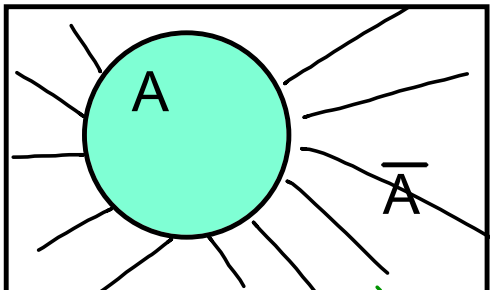


Hvis $A \cap B = \{\phi\}$

$$\Rightarrow P[A \cap B] = 0$$

$$\Rightarrow P[A \cup B] = P[A] + P[B]$$

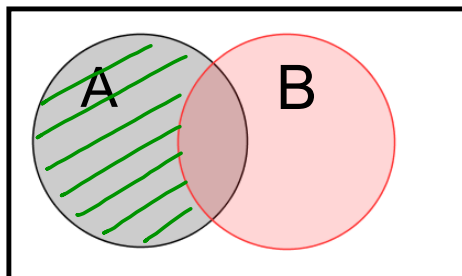
Kompliment hendelser



$$P[\bar{A}] = 1 - P[A]$$

$$A \cap \bar{A} = \{\phi\}$$

$$\Rightarrow P[A \cap \bar{A}] = 0$$

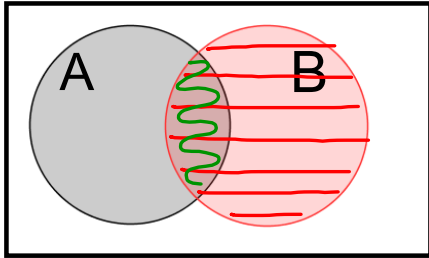


$$P[A \setminus B] = P[A] - P[A \cap B]$$

$A \setminus B$ - Hendelser A men ikke B

- Bare hendelser A

Betinget sannsynlighet



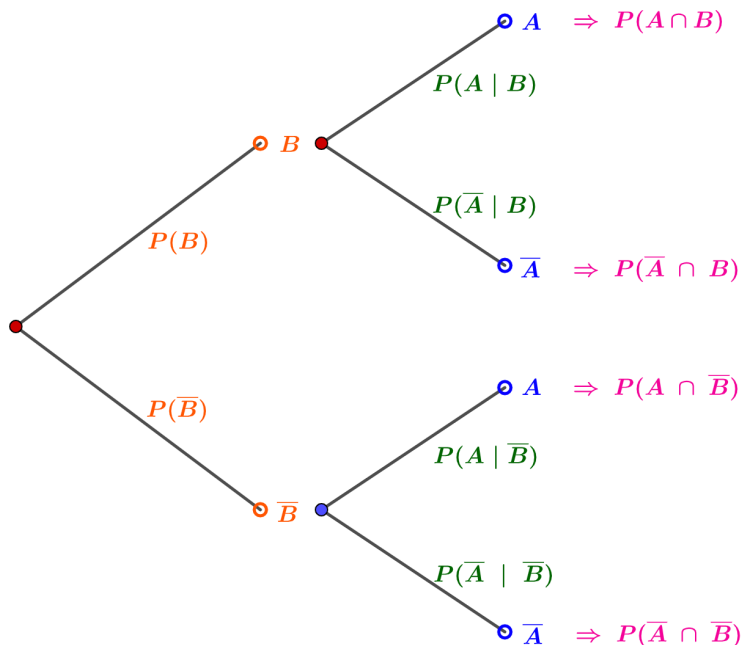
$$P[A | B] = \frac{\text{Antall enheter i område } A \cap B}{\text{Antall enheter i område } B}$$

$$P[A | B] = \frac{N[A \cap B]}{N[B]} \Rightarrow P[A | B] = \frac{P[A \cap B]}{P[B]}$$

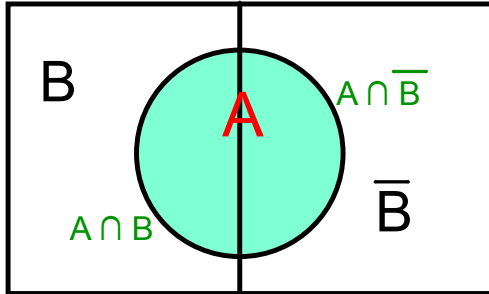
Prouduktsetningen

$$P[A | B] = \frac{P[A \cap B]}{P[B]} \Rightarrow P[A \cap B] = P[A | B] \cdot P[B]$$

Produktsetningen med valg tre



Total sannsynlighet



$$\begin{aligned}P[A] &= P[A \cap B] + P[A \cap \overline{B}] \\&= P[A|B] \cdot P[B] + P[A|\overline{B}] \cdot P[\overline{B}]\end{aligned}$$

Betinget sannsynlighet

$$P[A|B] = \frac{P[A \cap B]}{P[B]}$$

$\Rightarrow$

$$P[B|A] = \frac{P[A \cap B]}{P[A]}$$

$\Rightarrow$

$$P[B|A] = \frac{P[A|B] \cdot P[B]}{P[A]}$$

Bayes' setning

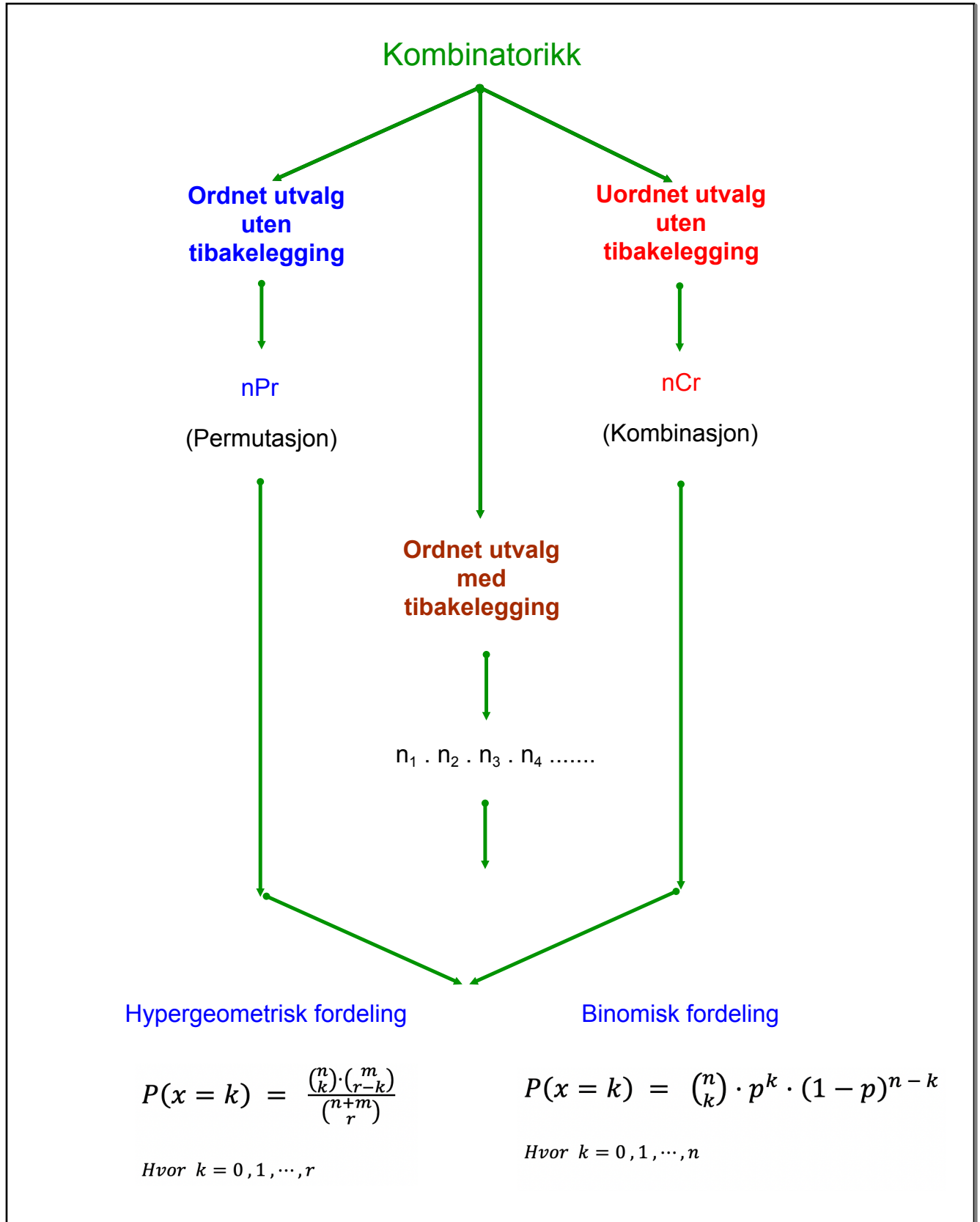
Kombinatorikk

$$n! = n(n-1)(n-2) \cdots 3 \cdot 2 \cdot 1$$

$${}_n P r = \frac{n!}{(n-r)!}$$

$${}_n C r = \binom{n}{r} = \frac{n!}{r!(n-r)!}$$

$$\binom{n}{r} = \binom{n}{n-r}$$



Hypergeometrisk sannsynlighet

Når vi skal ta et **tilfeldig utvalg** fra en **mengde med to eller flere ulike elementer**, får vi en sannsynlighetsfordeling som vi kaller hypergeometrisk.

Eksempel:

I et lotteri er det 50 lodd. 10 av loddene gir gevinst. Knut kjøper 4 lodd.

a) Hva er sannsynligheten for at han vinner på akkurat ett av loddene?

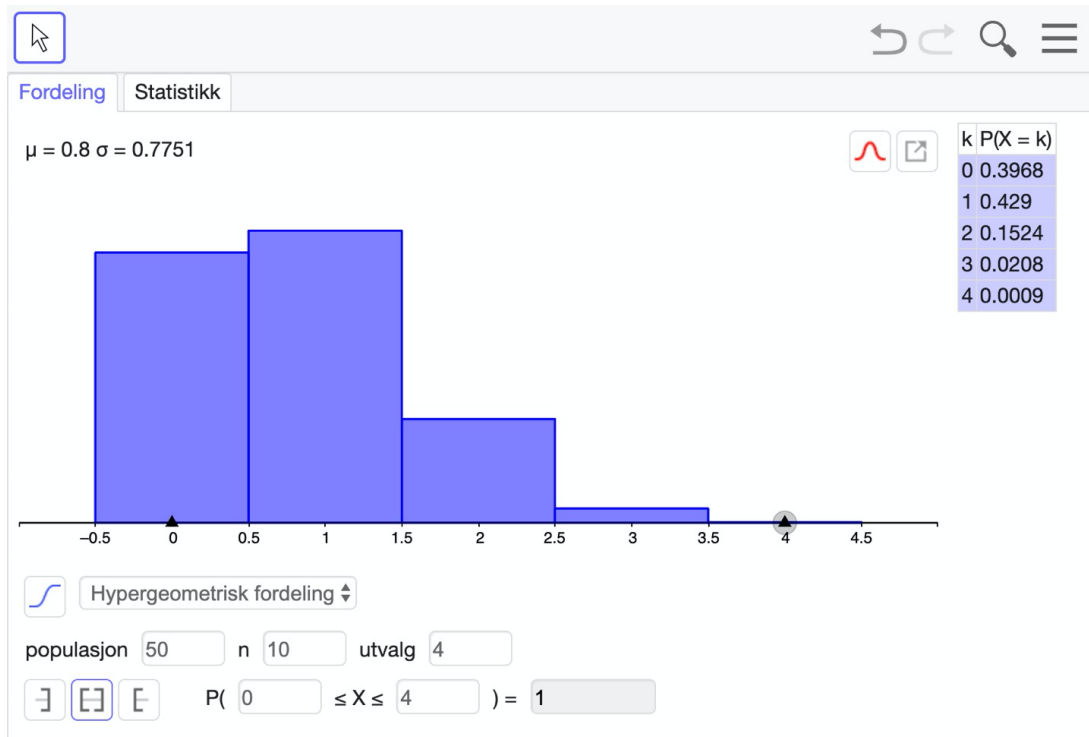
Svar: $P(x = 1) = 0,429$

b) Hva er sannsynligheten for at han vinner på to av loddene?

Svar: $P(x = 2) = 0,1524$

c) Hva er sannsynligheten for at han ikke vinner på noen av loddene?

Svar: $P(x = 0) = 0,3968$



Binomisk sannsynlighet

Et binomisk forsøk er et sammensatt forsøk som består av n delforsøk:

- I hvert delforsøk er det to muligheter
- Enten inntreffer en bestemt hendelse S , eller så inntreffer den ikke.
- I hvert delforsøk er sannsynligheten p for S skal inntreffe og $1 - p$ for at den ikke skal inntreffe
- Delforsøkene er uavhengige

Eksempel

Langs en del av kysten regner man med 30% av all øret smittet av en bestemt sykdom. Vi fanger 6 tilfeldig ørreter. Finn sannsynligheten for at

a) alle 6 er smittet

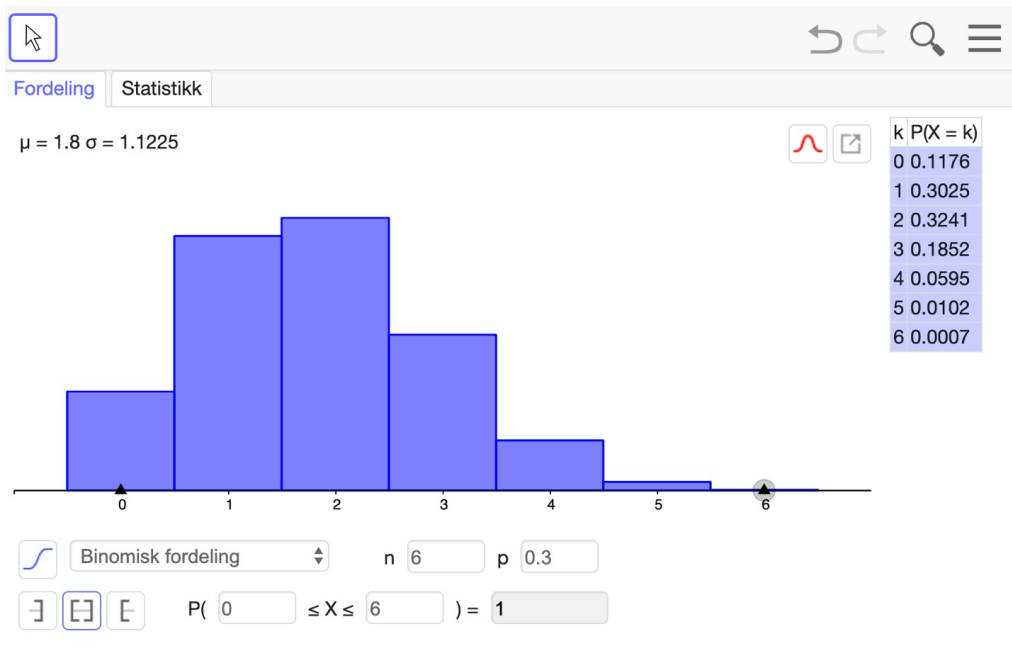
Svar: $P(x = 6) = 0,0007$

b) akkurat 3 er smittet

Svar: $P(x = 3) = 0,1852$

c) ingen er smittet

Svar: $P(x = 0) = 0,1176$



Matematikk R1

Row 0:					1																		
Row 1:					1		1																
Row 2:					1		2		1														
Row 3:					1		3		3		1												
Row 4:					1		4		6		4		1										
Row 5:					1		5		10		10		5		1								
Row 6:					1		6		15		20		15		6		1						
Row 7:					1		7		21		35		35		21		7		1				
Row 8:					1		8		28		56		70		56		28		8		1		
Row 9:					1		9		36		84		126		126		84		36		9		1
Row 10:	1				10		45		120		210		252		210		120		45		10		1

$$\begin{array}{l}
\text{Row 0:} \qquad \qquad \qquad \binom{0}{0} \\
\text{Row 1:} \qquad \qquad \qquad \binom{1}{0} \quad \binom{1}{1} \\
\text{Row 2:} \qquad \qquad \qquad \binom{2}{0} \quad \binom{2}{1} \quad \binom{2}{2} \\
\text{Row 3:} \qquad \qquad \qquad \binom{3}{0} \quad \binom{3}{1} \quad \binom{3}{2} \quad \binom{3}{3} \\
\text{Row 4:} \qquad \qquad \qquad \binom{4}{0} \quad \binom{4}{1} \quad \binom{4}{2} \quad \binom{4}{3} \quad \binom{4}{4} \\
\text{Row 5:} \qquad \qquad \qquad \binom{5}{0} \quad \binom{5}{1} \quad \binom{5}{2} \quad \binom{5}{3} \quad \binom{5}{4} \quad \binom{5}{5} \\
\text{Row 6:} \qquad \qquad \qquad \binom{6}{0} \quad \binom{6}{1} \quad \binom{6}{2} \quad \binom{6}{3} \quad \binom{6}{4} \quad \binom{6}{5} \quad \binom{6}{6} \\
\text{Row 7:} \qquad \qquad \qquad \binom{7}{0} \quad \binom{7}{1} \quad \binom{7}{2} \quad \binom{7}{3} \quad \binom{7}{4} \quad \binom{7}{5} \quad \binom{7}{6} \quad \binom{7}{7} \\
\text{Row 8:} \qquad \qquad \qquad \binom{8}{0} \quad \binom{8}{1} \quad \binom{8}{2} \quad \binom{8}{3} \quad \binom{8}{4} \quad \binom{8}{5} \quad \binom{8}{6} \quad \binom{8}{7} \quad \binom{8}{8} \\
\text{Row 9:} \qquad \qquad \qquad \binom{9}{0} \quad \binom{9}{1} \quad \binom{9}{2} \quad \binom{9}{3} \quad \binom{9}{4} \quad \binom{9}{5} \quad \binom{9}{6} \quad \binom{9}{7} \quad \binom{9}{8} \quad \binom{9}{9} \\
\text{Row 10:} \quad \binom{10}{0} \quad \binom{10}{1} \quad \binom{10}{2} \quad \binom{10}{3} \quad \binom{10}{4} \quad \binom{10}{5} \quad \binom{10}{6} \quad \binom{10}{7} \quad \binom{10}{8} \quad \binom{10}{9} \quad \binom{10}{10}
\end{array}$$

Row 0	$(a+b)^0$	1
Row 1	$(a+b)^1$	$1a + 1b$
Row 2	$(a+b)^2$	$1a^2 + 2ab + 1b^2$
Row 3	$(a+b)^3$	$1a^3 + 3a^2b + 3ab^2 + 1b^3$
Row 4	$(a+b)^4$	$1a^4 + 4a^3b + 6a^2b^2 + 4ab^3 + 1b^4$
Row 5	$(a+b)^5$	$1a^5 + 5a^4b + 10a^3b^2 + 10a^2b^3 + 5ab^4 + 1b^5$