ØVING 1 side 1

Andreas B. Berg

2.2

2) 3 terninger i ulike farge. Hvilke kombinasjoner gir sum = 5

rød	blå	grønn	total
1	1	3	5
1	2	2	5
1	3	1	5
2	1	2	5
2	2	1	5
3	1	1	5

Kombinasjonene $\{113, 122, 131, 212, 221, 311\}$

gir sum = 5

7) La P være rettvinklede trekanter med hyp = 5", høyde = a og bredde = b.

Da er

$$P = \{\text{rettvinklede trekanter med sider } (5, a, b) \mid a^2 + b^2 = 25\}$$

10) a) (u, v) = dart 1 : u, dart 2 : v. Da har vi:

$$(u, v) \in \{(1,1), (1,2), (1,4), (2,2), (2,1), (2,4), (4,1), (4,2), (4,4)\}$$

b) Sum = $u + v$. Da er

$$\text{Sum} \in \{2, 3, 4, 5, 6, 8\}$$

12) $ax^2 + bx + c$ A : likningen har komplekse røtter

Likningen har komplekse røtter hvis $b^2 - 4ac < 0$, så

$$A = \{ax^2 + bx + c \mid b^2 - 4ac < 0\}$$

18) $A = \{x \mid 0 \leq x \leq 4\}$, $B = \{x \mid 2 \leq x \leq 6\}$, $C = \{x \mid x = 0, 1, 2 \ldots\}$

$$A \cap B \cap C = (A \cap B) \cap C = \{x \mid 2 \leq x \leq 4\} \cap \{x \mid x = 0, 1, 2 \ldots\}$$

$$= \{2, 3, 4\}$$

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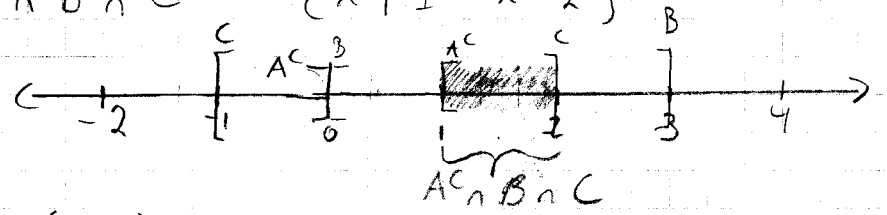
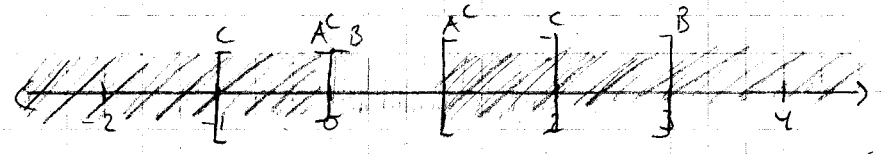
2o) $A = \{x \mid 0 \le x \le 1\}$, $B = \{x \mid 0 \le x \le 3\}$, $C = \{x \mid -1 \le x \le 2\}$

Tegn:

a) $A^c \cap B \cap C = \{x \mid 1 \le x \le 2\}$

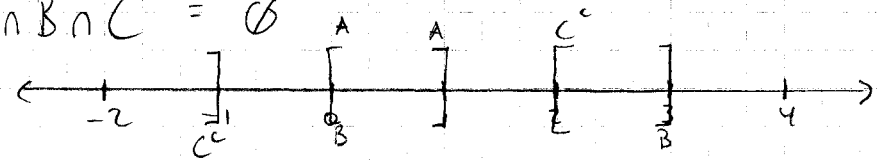


b) $A^c \cup (B \cap C) = \{x \mid x \le 0\} \cup \{x \mid 0 \le x \le 2\} \cup \{x \mid x \ge 1\} = \mathbb{R}$

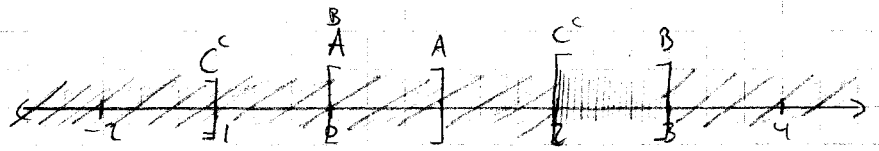


//// $= A^c$, /// $= B \cap C$, //// $\cup$ /// $= A^c \cup (B \cap C)$

c) $A \cap B \cap C^c = \emptyset$



d) $[(A \cup B) \cap C^c]^c = [B \cap C^c]^c = [\{x \mid 2 \le x \le 3\}]^c = \{x \mid x \le 2 \text{ eller } x \ge 3\}$



/// $= (A \cup B) \cap C^c$ //// $= ((A \cup B) \cap C^c)^c$

2.3

2) $P(A) = 0.4$ $P(B) = 0,5$ $P(A \cap B) = 0.1$

Hva er $P(A$ el. B, ikke $A \cap B)$?

$P(A \cup B) = P(A) + P(B) - P(A \cap B) = 0.4 + 0,5 - 0.1 = 0.8$

$P(A$ el. B, ikke begge$) = P(A \cup B) - P(A \cap B) = 0.8 - 0.1 = \underline{0.7}$

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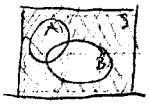
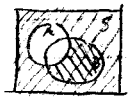
3)a) $P(A^c \cup B^c) = \underline{1 - P(A \cap B)}$  (alt - snittet)

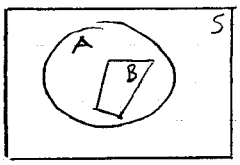
b) $P(A^c \cap (A \cup B)) = \underline{P(B) - P(A \cap B)}$ 

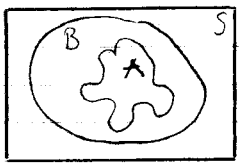
4) $P(A \cup B) = 0,3 = P(A) + P(B) - P(A \cap B)$ (i)

$P(A \text{ ikke } B) = P(A) - P(A \cap B) = 0,1$

i): $0,3 = P(B) + P(A) - P(A \cap B) = P(B) + 0,1$

$\underline{P(B) = 0,2}$

8)a) $P(A \cap B) = P(B)$ 

b) $P(A \cup B) = P(B)$ 

12) $A_1 \cup A_2 = S$, $A_1 \cap A_2 = \emptyset$, $P(A_1) = p_1$, $P(A_2) = p_2$, $3p_1 - p_2 = \frac{1}{2}$

$p_1 = 1 - p_2$

$3(1 - p_2) - p_2 = \frac{1}{2}$

$3 - 4p_2 = \frac{1}{2}$

$-4p_2 = -\frac{5}{2}$

$\underline{p_2 = \frac{5}{8}}$

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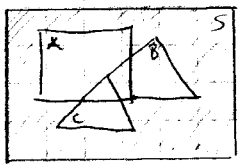
14) $P(A) = 0,2 \quad P(B) = 0,1 \quad P(C) = 0,3$



Hva er minste verdi for $P[(A \cup B \cup C)^c]$?

Minste $P[(A \cup B \cup C)^c]$ får vi når A, B, C er disjunkte hendelser. Da er

$$P(A \cup B \cup C) = P(A) + P(B) + P(C) = 0,6$$ og dermed

$$P[(A \cup B \cup C)^c] = 1 - P(A \cup B \cup C) = 1 - 0,6 = \underline{0,4}$$

Eks. 17

1a) At to hendelser B og C er uavhengige, vil si at de ikke påvirker hverandre, hendelse B har samme sannsynlighet uansett om C har skjedd eller ikke, og vice versa.

Sagt matematisk:

$$P(B \mid C) = P(B)$$
$$P(C \mid B) = P(C)$$

Eksempel på to uavhengige hendelser:

Kast en mynt to ganger. La C = kron på første kast, B = mynt på andre kast. Da er B og C uavhengige hendelser.