MATEMATIK F2

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Tekst til opgaver i afsnit 23.3 i 7. ed. (22.4 i 8. ed.):

Opgave 3: In how many ways can we assign 8 workers to 8 jobs (one worker to each job and conversely)?

Opgave 5: How many different samples of 3 objects can be drawn from a lot of 50 objects?.

Opave 7: Of a lot of 10 items, 2 are defective. (a) Find the number of different samples of 4. Find the number of samples of 4 containing (b) no defectives, (c) 1 defective, (d) 2 defectives.

Opgave 9: Determine the number of different bridge hands. (A bridge hand consists of 13 cards selected from a full deck of 52 cards.)

Opgave 11: If 3 suspects who committed a buglary and 6 innocent persons are lined up, what is the probability that a witness who is not sure and has to pick three persons will pick the three suspects by chance? That the witness picks 3 innocent persons by chance?

Opgave 13: How many different license plates showing 5 symbols, namely, 2 letters followed by 3 digits, could be made?

Opgave 14: What is the probability that in a group of 20 people (that includes no twins) at least two have the same birthday, if we assume that the probability of having birthday at a given day is 1/365 for every day. First guess, then calculate.

Opgave 16: Prove the last statement of Theorem 3. Hint. Use (13).

Opgave 18: (Binomial theorem) By the binomial theorem,

$$(a+b)^n = \sum_{k=0}^{n} \binom{n}{k} a^k b^{n-k}, \qquad \text{so that } a^k b^{n-k} \text{ has the coefficient } \binom{n}{k}.$$

Can you conclude this from Theorem 3 or is this merely a coincidence?

Opgave 20: Prove (14) by applying the binomial theorem (Prob. 18) to

$(1+b)^p(1+b)^q = (1+b)^{p+q}$.

Tekst til opgaver i afsnit 23.4 i 7. ed. (22.5 i 8. ed.):

Opgave 6: Sketch the density $f(x) = 0.4$ if $3 < x < 5.5$ and the distribution function.

Opgave 7: In Prob. 6 find $P(0 \leq X \leq 4)$. Find x such that $P(X \leq x) = \frac{1}{2}$.

Opgave 10: Suppose that certain bolts have length $L = 200 + X$ mm, where X is a random variable with density $f(x) = \frac{3}{4}(1 - x^2)$ if $-1 \leq x \leq 1$ and 0 otherwise. Determine c so that with a probability of 95% a bolt will have any length between $200 - c$ and $200 + c$. Hint. See also Example 5.

Opgave 14: Consider the random variable $X =$ *Number of times a fair dice is rolled until the first Six appears.* Find the probability function of X; show that it satisfies (6).

Opgave 20: A box contains 4 right-handed and 6 left-handed screws. Two screws are drawn at random without replacement. Let X be the number of left-handed screws. Find the probabilities $P(X = 0)$, $P(X = 1)$, $P(X = 2)$, $P(1 < X < 2)$, $P(X \leq 1)$, $P(X \geq 1)$, $P(X > 1)$, and $P(0.5 < X < 10)$.