Tölfræði I

Dæmablað 2

Skilið öllum dæmunum mánudaginn 31.8.2015 fyrir kl. 12:00 í viðeigandi hólf í Sólinni.
Dæmi í bók miðast við Statistics for Engineers and Scientists, 3./4. ed. eftir William Navidi.

Dæmi 1:
Dæmi 4 í Exercises for Section 2.1 í bókinni.

4. A commuter passes through three traffic lights on the way to work. Each light is either red, yellow, or green. An experiment consists of observing the colors of the three lights.

a. List the 27 outcomes in the sample space.

b. Let A be the event that all the colors are the same. List the outcomes in A.

c. Let B be the event that all the colors are different. List the outcomes in B.

d. Let C be the event that at least two lights are green. List the outcomes in C.

e. List the outcomes in $A \cap C$.

f. List the outcomes in $A \cup B$.

g. List the outcomes in $A \cap C^c$.

h. List the outcomes in $A^c \cap C$.

i. Are events A and C mutually exclusive? Explain.

j. Are events B and C mutually exclusive? Explain.

Dæmi 2:
Dæmi 12 og 13 í Exercises for Section 2.1 í bókinni. Að auki: látum $A, B \subset S$. Teiknið Venn gröf fyrir mengin $A^C \cap B^C$, $A^C \cup B^C$, $(A \cap B)^C$ og $(A \cup B)^C$.

12. Let V be the event that a computer contains a virus, and let W be the event that a computer contains a worm. Suppose $P(V) = 0.15$, $P(W) = 0.05$, and $P(V \cup W) = 0.17$.

a. Find the probability that the computer contains both a virus and a worm.

b. Find the probability that the computer contains neither a virus nor a worm.

c. Find the probability that the computer contains a virus but not a worm.

13. Let S be the event that a randomly selected college student has taken a statistics course, and let C be the event that the same student has taken a chemistry course. Suppose $P(S) = 0.4$, $P(C) = 0.3$, and $P(S \cap C) = 0.2$.

a. Find the probability that a student has taken statistics, chemistry, or both.

b. Find the probability that a student has taken neither statistics nor chemistry.

c. Find the probability that a student has taken statistics but not chemistry.

Dæmi 3:
Dæmi 2, 10 og 11 í Exercises for Section 2.2 í bókinni.

2. A chemical engineer is designing an experiment to determine the effect of temperature, stirring rate, and type of catalyst on the yield of a certain reaction. She wants to study five different reaction temperatures, two different stirring rates, and four different catalysts. If each run of the experiment involves a choice of one temperature, one stirring rate, and one catalyst, how many different runs are possible?

10. A company has hired 15 new employees, and must assign 6 to the day shift, 5 to the graveyard shift, and 4 to the night shift. In how many ways can the assignment be made?

11. One drawer in a dresser contains 8 blue socks and 6 white socks. A second drawer contains 4 blue socks and 2 white socks. One sock is chosen from each drawer. What is the probability that they match?

Dæmi 4:
Dæmi 9 í Exercises for Section 2.2 í bókinni.

9. A computer password consists of eight characters.

   a. How many different passwords are possible if each character may be any lowercase letter or digit?

   b. How many different passwords are possible if each character may be any lowercase letter or digit, and at least one character must be a digit?

   c. A computer system requires that passwords contain at least one digit. If eight characters are generated at random, and each is equally likely to be any of the 26 letters or 10 digits, what is the probability that a valid password will be generated?

Dæmi 5:
Dæmi 3 og 7 í Exercises for Section 2.3 í bókinni.

3. A box contains 10 fuses. Eight of them are rated at 10 amperes (A) and the other two are rated at 15 A. Two fuses are selected at random.

   a. What is the probability that the first fuse is rated at 15 A?

   b. What is the probability that the second fuse is rated at 15 A, given that the first fuse is rated at 10 A?

   c. What is the probability that the second fuse is rated at 15 A, given that the first fuse is rated at 15 A?

7. Suppose that start-up companies in the area of biotechnology have probability 0.2 of becoming profitable, and that those in the area of information technology have probability 0.15 of becoming profitable. A venture capitalist invests in one firm of each type. Assume the companies function independently.

   a. What is the probability that both companies become profitable?

   b. What is the probability that neither company becomes profitable?

   c. What is the probability that at least one of the two companies become profitable?