1. Ans: D
   Sample space $= 2 \times 2 \times 3 \times 4 = 48$
2. Ans: A

$$A^C \cap B^C = \{hh, ht, th\}^C \cap \{ht, th, tt\}^C = \{tt\} \cap \{hh\} = \emptyset$$

3. Ans: D
   We have

$$A^C = \{x : x < 10 \quad \text{or} \quad 12 \leq x\}$$

   and

$$B = \{x : 11 < x < 15\}$$

   so that

$$A^C \cap B = \{x : 12 \leq x < 15\}$$

4. Ans: B
   Each design is a subset of 5 selected from the 8 locations that are to contain the components and order is not important. The number of possible designs is $\binom{8}{5} = \frac{8!}{5!3!} = 56$
5. Ans: C
   The number of possible sequences of 3 knee and 2 hip surgeries is $\frac{5!}{2!3!} = 10$
6. Ans: C

$$P(A \cap B^C) = P(A) - P(A \cap B) = 0.4 - 0.1 = 0.3$$

7. i) Ans: A
   The number with no defective parts occurs when all 6 parts are selected from 47 nondefective one is

$$\binom{47}{6} = \frac{47!}{6!(47-6)!} = 10,737,573$$

   The total number of size 6 selected from 50 parts is

$$\binom{50}{6} = \frac{50!}{6!(50-6)!} = 15,890,700$$

   The probability that no defective parts is

$$\frac{10,737,573}{15,890,700} = 0.676$$

   ii) Ans: C
   The number with 2 defective parts occurs when all 6 parts are selected from 47 nondefective one is

$$\binom{3}{2} \times \binom{47}{4} = \frac{3!}{2!(3-2)!} \times \frac{47!}{4!(47-4)!} = 3 \times 178,365 = 535,095$$

   The probability that contain exactly 2 defective parts is

$$\frac{535,095}{15,890,700} = 0.034$$

8. i) Ans: B
   Probability of defective $P(D) = \frac{10+18}{400} = 0.07$
   ii) Ans: D
   Probability of defective with surface flaws $P(D|F) = \frac{10}{40} = 0.25$