MORPHOLOGICAL OPERATIONS

Problem 1

Apply the open and close operations to the object below. Present the intermediate and final results for the two cases.

```
XXX                        Structure element with origo underlined
XXXX
XXX                            XXX
XXX                            XXX
XXX                            XXX
X
XXX
XXX
XXX
```

Problem 2

a) Two Christmas gifts in the form of boxes touches by mistake (see below). Propose a method to split them apart, apply the actual operation and then present the intermediate as well as the final result. The rosette on top should remain after splitting the boxes. (2p)

```
   X     X
 XXX  XXX
 XXX  XXX
 XXXXXXX
```

b) Extract the skeleton of the Christmas tree below by using the attack-from-different-directions algorithm. You should present the intermediate results. (4p)

```
       X

      XXX
       X
     XXXXX
      XXX
    XXXXXXX
       X
       X
```

c) Describe by words or mathematical notation the hit-miss operator. (1p)

d) One popular shape feature is SQR(p)/(4 * PI * A). Explain the symbols p and A in this formula. In which situations may this feature be less useful? Describe the ingredients (specify what needs to be calculated) of a shape feature suitable for strongly irregular shapes. (3p)