

1. A digital document is characterized by name and authorName and contains pages. Each page has a pageNumber which is an integer and contains pageElements which are bidimensional graphical figures (polygon, ellipse and/or circle) and groups. A group contains groupElements which may include other groups and/or bidimensional graphical figures. A polygon is defined by an ordered set of 3 or more vertices. An ellipse is defined by 2 points referred as foci (focus points) and by a distance which is an integer. A circle is defined by a point referred as center and a radius which is an integer. Each point is defined by 2 coordinates referred as x and y and by a color. The value of x and y are integers because it is about pixels. The colors are the fundamental colors: red, green, blue. Each graphical object can be moved by a reference (x:Integer, y:Integer) or can be rotated by an angle having an integer value and by a line defined by 2 points. A bidimensional graphical figure can be filled by a color.
 - a. Using the UML, please represent a class diagram complying with the above-mentioned requirements. Please design an extensible model (the color numbers may be increased; other kind of graphical figures may be added). 3pt
 - b. Using the OCL, please specify invariants for ellipses and circles. In case of the ellipse, the two foci must be different, and the distance value must be equal or greater than 2. In case of circle, the radius must be equal or greater than 2. In case of the move operation defined on points, please specify a postcondition ensuring that after applying this operation, the coordinates of the point will be increased by the reference values and the operation different on points. 2pt
2. In the two figures below, there are represented related elements of two different UML views.
 - a) Please name these views and the elements represented in each view. 1pt
 - b) Please mention the tuple of related elements from these 2 views and justify if the information of these views represented by diagrams are consistent or not. 2pt

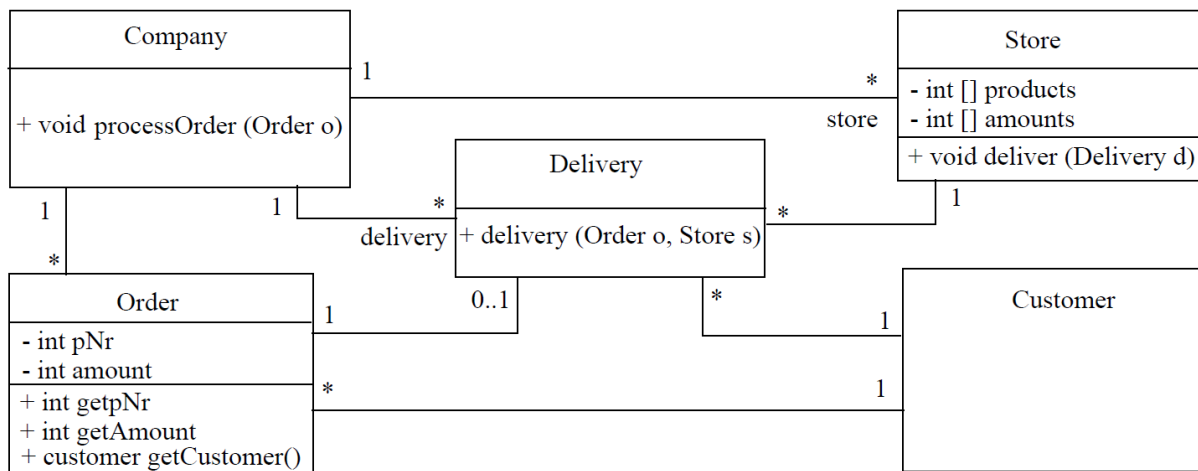


Figure 1

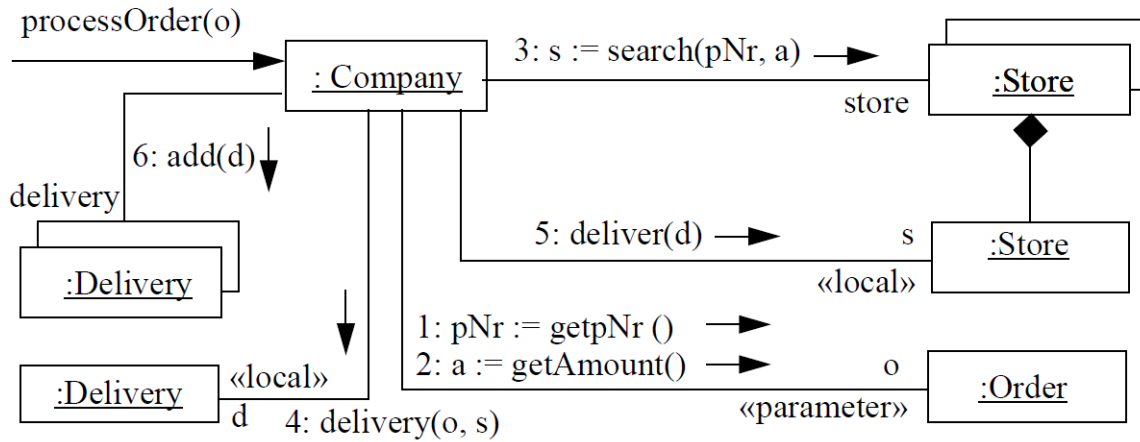


Figure 2

3. Let us consider the diagram represented in the figure below. Please enumerate the elements represented in this diagram and justify if the behavior specified is consistent or not mentioning all the rationale supporting your statement. 1pt

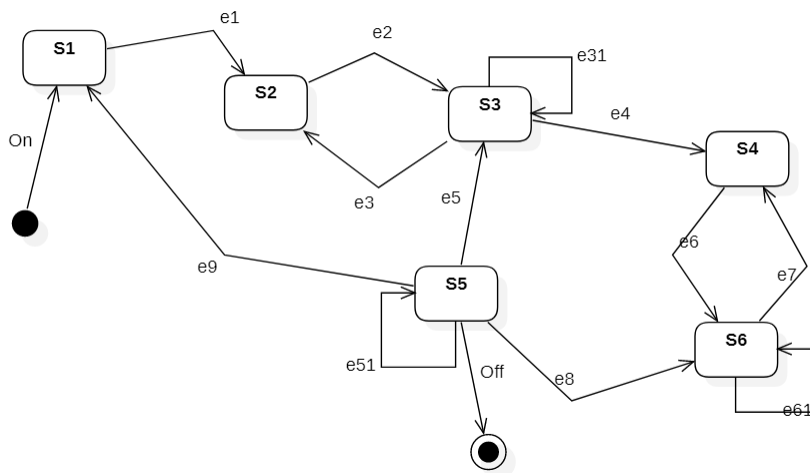


Figure 3

1pt by default, working time 2h

Please update your work (handwritten) at 12:00 PM the latest!