1. (2D Geometry) Write down the 3x3 homogeneous matrices for the following affine transformations. Your answer should be an array of 9 numbers in each case (20 pts)

(1) a translation by 3 along x and 2 along y

(2) a counterclockwise rotation by 45˚ about the origin

(3) a scale by 1.4 along the x axis

(4) a counterclockwise rotation by 30˚ about the origin followed by a translation by 4 along the x axis

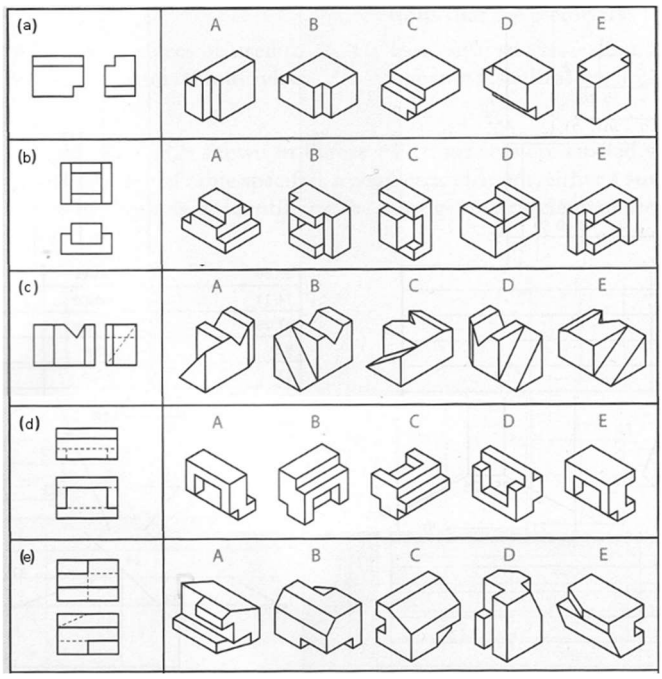
(5) a translation by 4 along the x axis followed by a counterclockwise rotation by 30˚ about the origin

(6) a counterclockwise rotation by 30˚ about the point (4, 0)

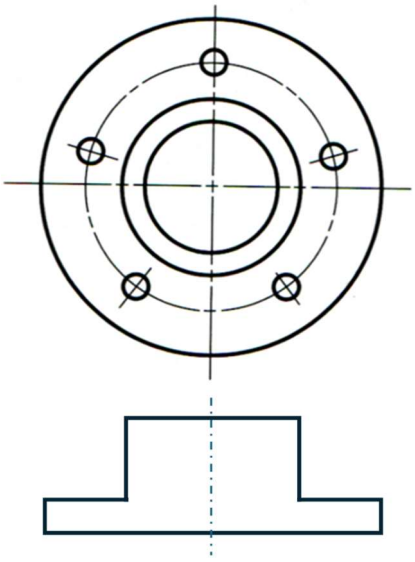
2. A viewing transformation for a camera at the position (0, 3, 4) looking at the origin with up vector (0, 1, 0). (15 pts)

3. 아래 multi-view projection을 보고 해당되는 isometric view를 찾으시오. (10 pts)

4. 아래 평면도를 참고하여 정면도를 단면도로 도시하시오. (5 pts)



Problem 3

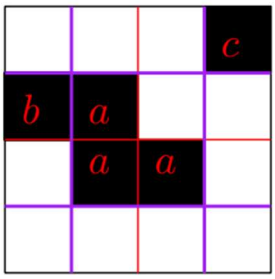


Problem 4

6. 직사각형과 원 primitive만을 이용하여 아래 D자 형상을 CSG로 모델링하려고 한다. 최소 수의 요소와 Boolean 연산으로 CSG tree를 그리시오. (좌표변환은 무시) (10 pts)

7. 아래 4x4 이미지를 표현하는 QUAD-TREE를 그리시오. (순서: 좌 하단 기준 시계방향) (10 pts)

Problem 6



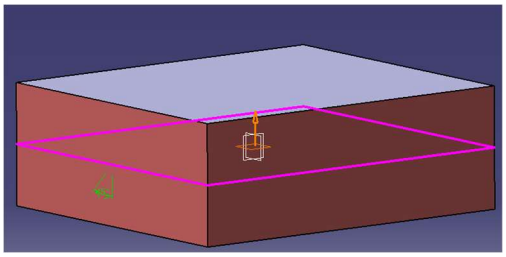
Problem 7

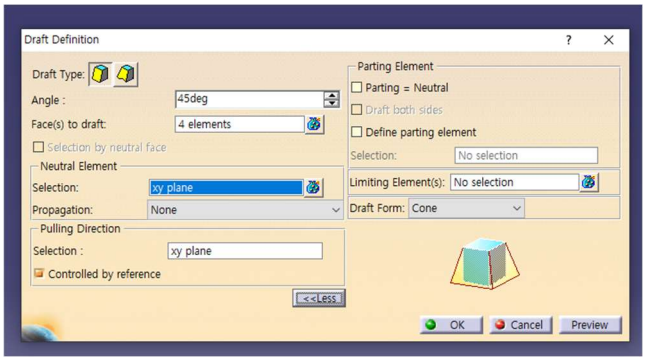
8. If two small boxes are subtracted from a large box, list the numbers of vertices, edges, faces, loops, shells and passages(or genus). Check whether the Euler-Poincaré holds. (10 pts)

9. Part Design에서 (1) Point, (2) Line, (3) Plane Reference를 만들기 위한 방법을 아래 목록에서 모두 찾으시오. (10 pts)

(a) Point-Point	(b) Parallel through point	(c) Between,
(d) Bisecting	(e) On curve	(f) Through point and line
(g) Circle/Sphere	(h) Offset from plane	(i) Point-Direction

10. 아래 draft angle기능(45°)을 수행할 때 예상되는 형상을 도시하시오. (2 pts each)



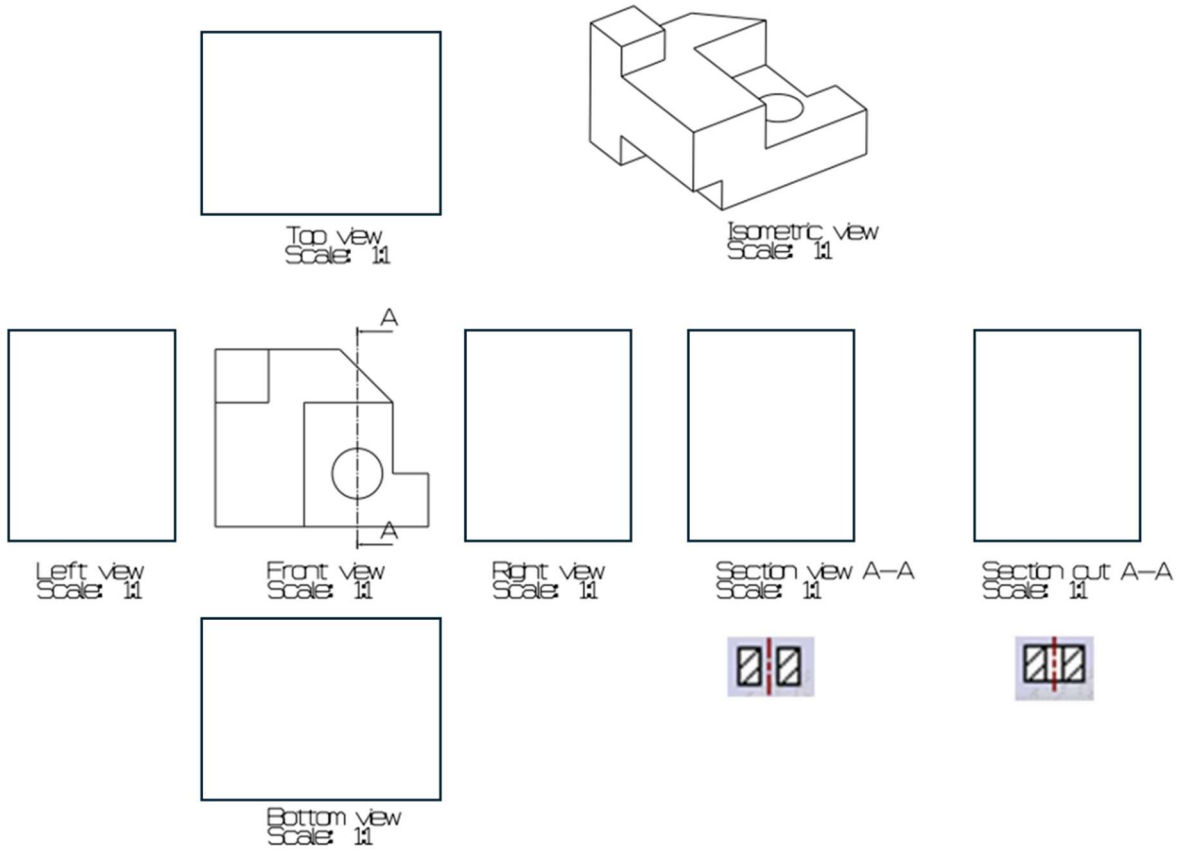


(1) Neutral Element (xy plane)

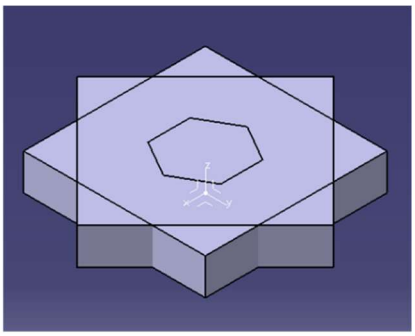
(2) Neutral Element (xy plane) / Parting = Neutral

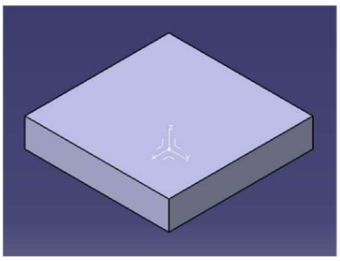
(3) Neutral Element (xy plane) / Parting = Neutral / Draft both sides

11. 아래 주어진 3차원 모델의 정면도와 등각투상도를 보고 제3각법을 적용하여 Top view, Bottom view, Right view, Left view와 단면도(Section view, Section cut) 결과를 도시하시오. (숨은선, 중심축 생략) (10 pts)

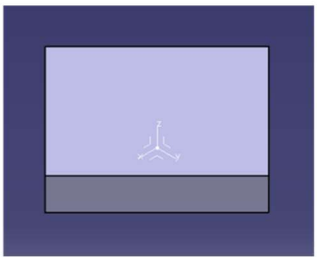


12. Part Design에서 세 개의 Body가 다음과 같이 구성되어 있을 때, 각 작업 트리에 맞는 결과를 찾으시오. (10 pts)

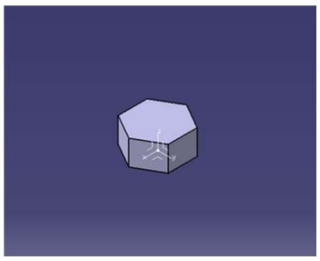




PartBody

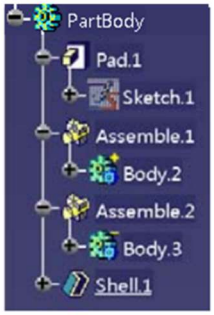


Body.2



Body.3

(1)

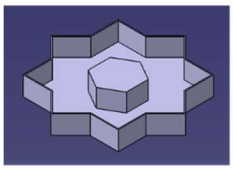


(2)

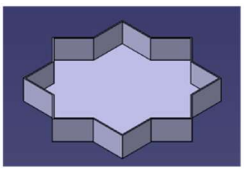
(3)

(4)

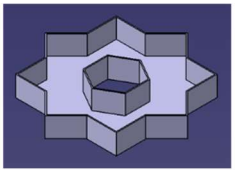
(5)



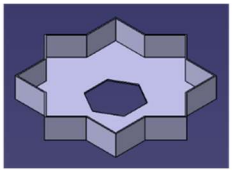
(a)



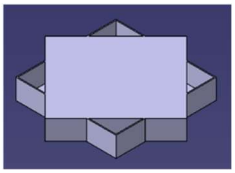
(b)



(c)



(d)



(e)