



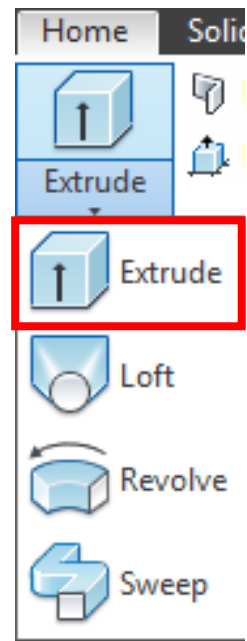
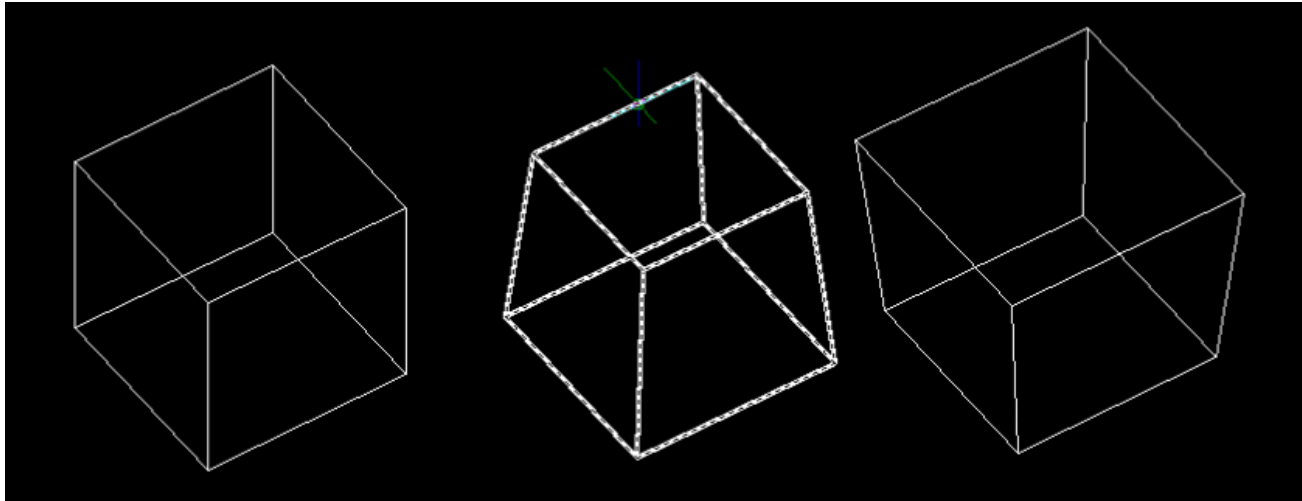
AutoCAD Level 3

Session 02

AGENDA

- THE EXTRUDE COMMAND
- SOLID MODELLING RULES
- ELEVATE BEFORE EXTRUDING
- 3D MOVE GIZMO
- BOOLEAN COMMANDS
 - SUBTRACT
 - UNION
 - INTERSECTION
- EXERCISE 2- LITTLE HOUSE
- EXERCISE 3- MECHANICAL PART 1

Extrude command



- When creating a box with the Extrude command you are creating solid object with 6 sides and no void in the middle.
- Extruding an object at a 0 (ZERO) taper angle will extrude on object directly along the z-axis
- A positive taper angle will extrude the object inwards. A negative taper angle will extrude the object outwards.
- Taper angles can be used in architecture to create slopes hipped roofs.
- Extruding a circle creates a cylinder. Extruding a circle with a taper angle creates a cone. Extruding a rectangle with a taper angle creates a pyramid.

Solid Modeling Rules

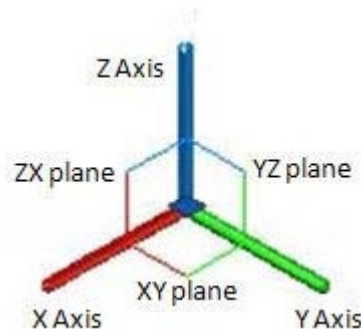
- Objects you can extrude must meet the following 3 criteria's:
 - 1) must be a one entity object (polyline)
 - 2) must be a closed entity
 - 3) must be non self intersecting
- To join lines into 1 polyline, use the JOIN command
- Use the Pedit command to also identify if the object is closed. If it gives you an option to close it, then you know that it is open.
- You can also use the BOUNDARY command to create closed polyline.

Elevating before extruding

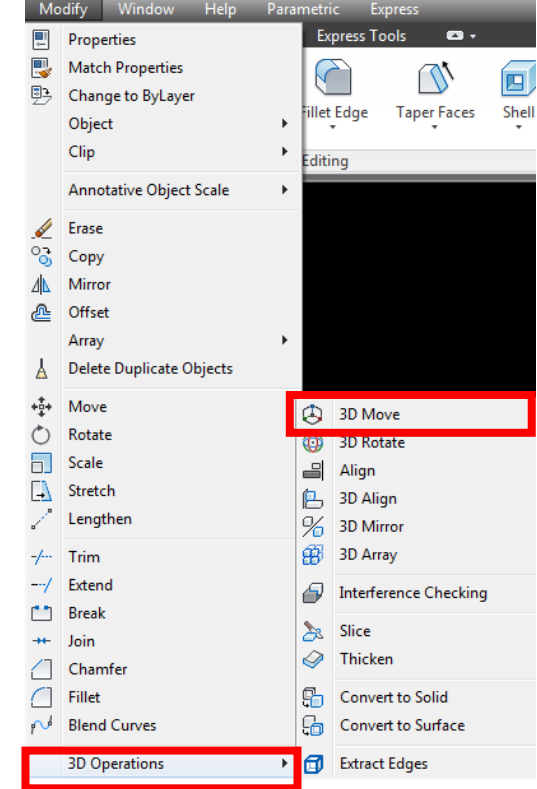
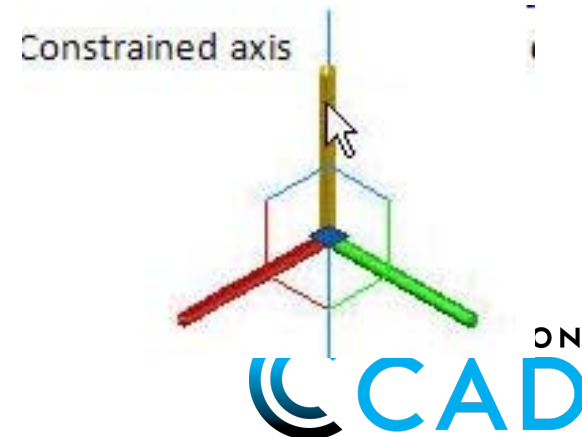
- When using the Change> Properties> Elevation command, the entity can not be a solid. It must be a 2d entity.
- Therefore before extruding an object, you must elevate it first before you extrude it.
- If the object is a solid and you need to elevate it, you can use a simple move command with the second point of displacement having a z value. @0,0,distance.
- Or use the 3D Gizmo tool

3d Move Gizmo

- The Move gizmo enables you to restrict the movement of selected objects or sub-objects to a specified axis or plane.
- When the Move gizmo is activated, it displays the X,Y, and Z axes as thick red, green, and blue vectors.

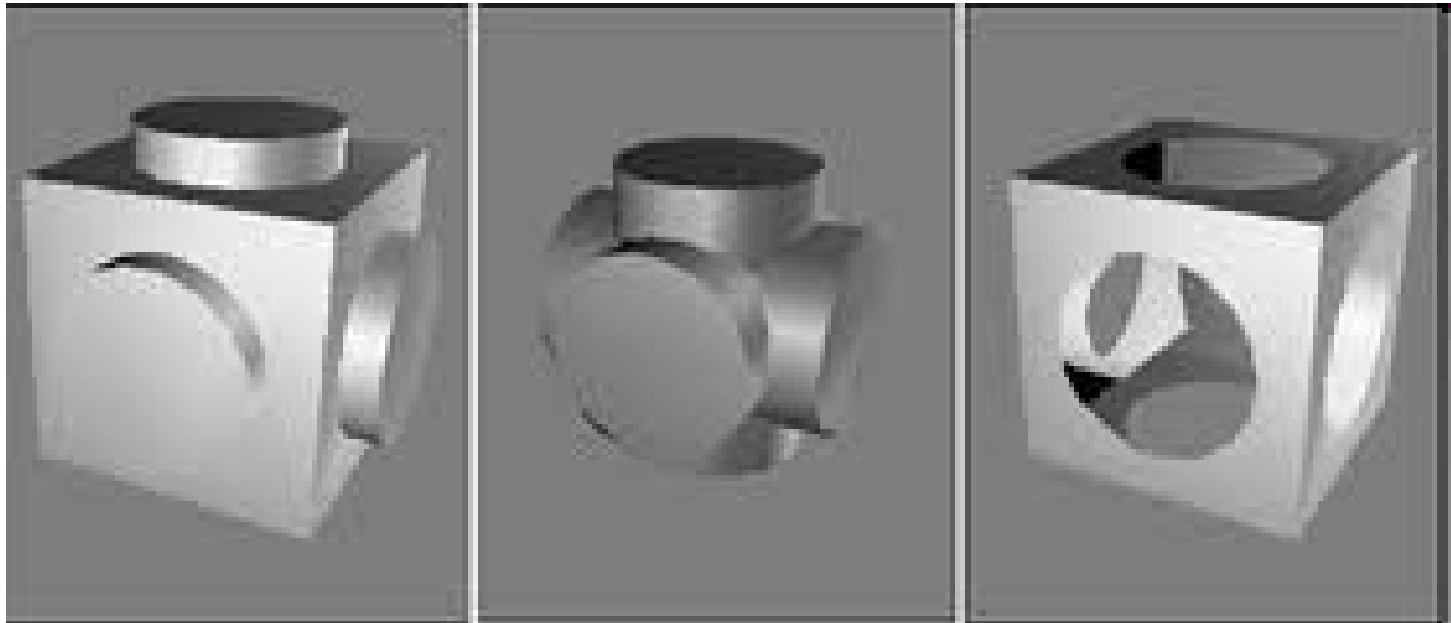


- If you pass the cursor over one of the vectors, the vector turns yellow and a continuous line is displayed in the original color indicating the axis of constraint. To constrain movement along the axis, click on the yellow vector.



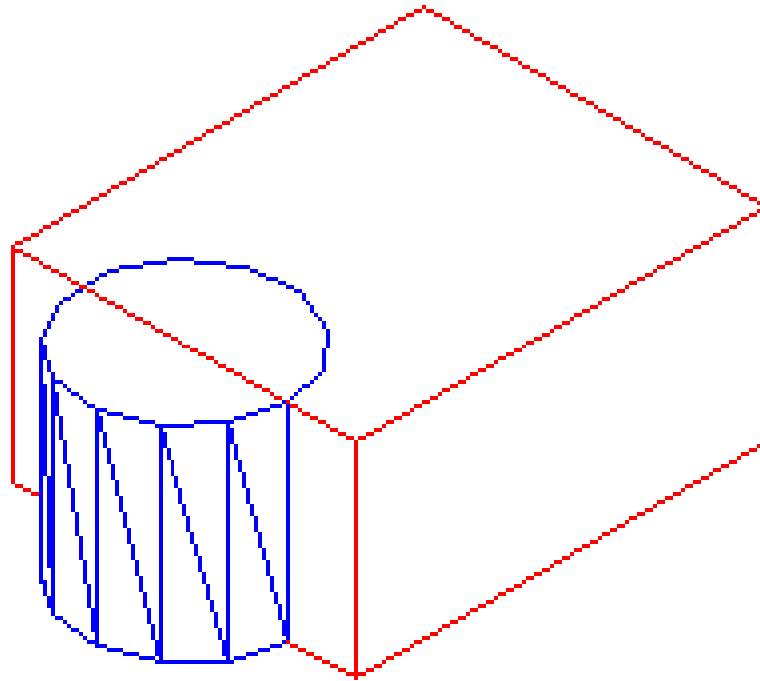
Boolean operations

- First, to explain the funny name : "It was named after George Boole, who first defined an algebraic system of logic in the mid 19th century."
- Working in 3D usually involves the use of solid objects. At times you may need to combine multiple parts into one, or remove sections from a solid. AutoCAD has some commands that make this easy for you. These are the boolean operations.



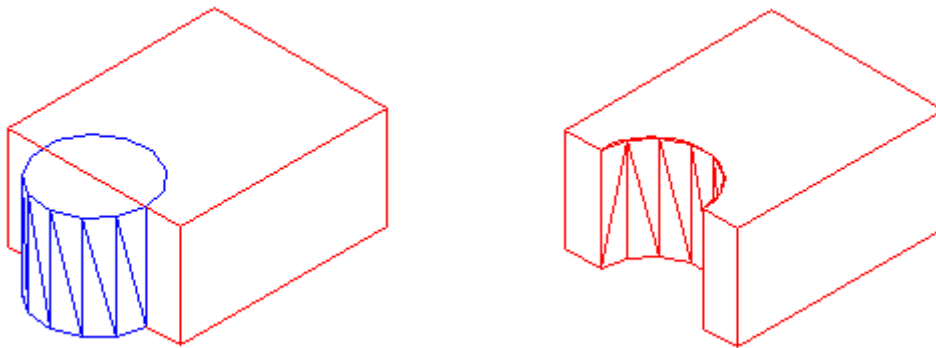
Boolean operations

- Draw the following two shapes that intersect each other:
- Box- 3w,4L,3h
- Cylinder- rad=1, h=3



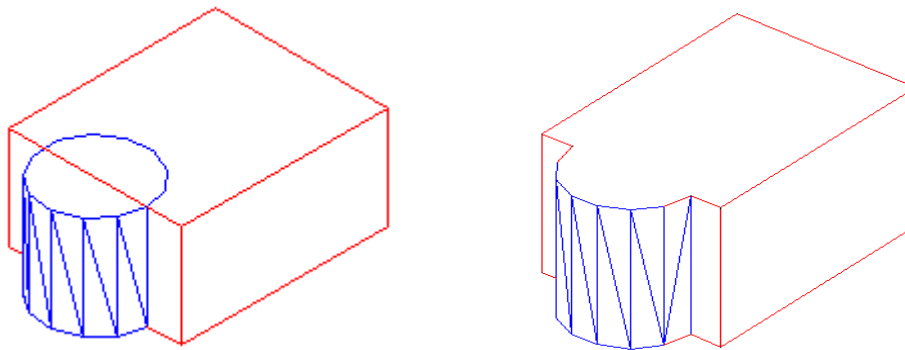
Subtract Command

- The subtract command is used to cut away, or remove the volume of one object from another. It is important to check the command line when using this command. Remember that AutoCAD always asks for the object that you are subtracting **FROM** first, then it asks for the objects to subtract. Here is an example:
- **Command: SUBTRACT (modify<solid editing>)**
Select solids and regions to subtract from...
Select objects: **<SELECT THE BLOCK> 1 found <ENTER>**
Select objects: Select solids and regions to subtract...
Select objects: **<SELECT THE CYLINDER> 1 found <ENTER>**
Select objects: **<ENTER>**



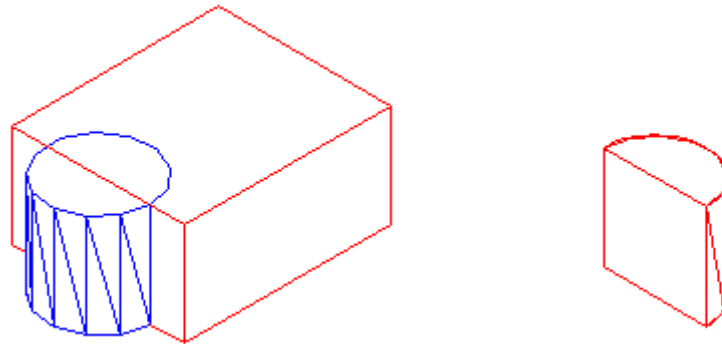
Union Command

- The UNION command combines one or more solid objects into one object.
- Command: **UNION <ENTER> (modify<solid editing>)**
Select objects: **<SELECT THE BLOCK> 1 found**
Select objects: **<SELECT THE CYLINDER> 1 found**
Select objects: **<ENTER>**
- NOTE: The object that you select **first** will determine the properties of the unioned object when it is created.

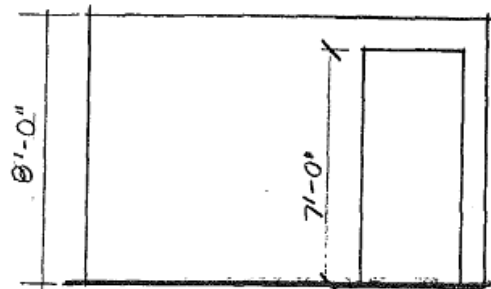
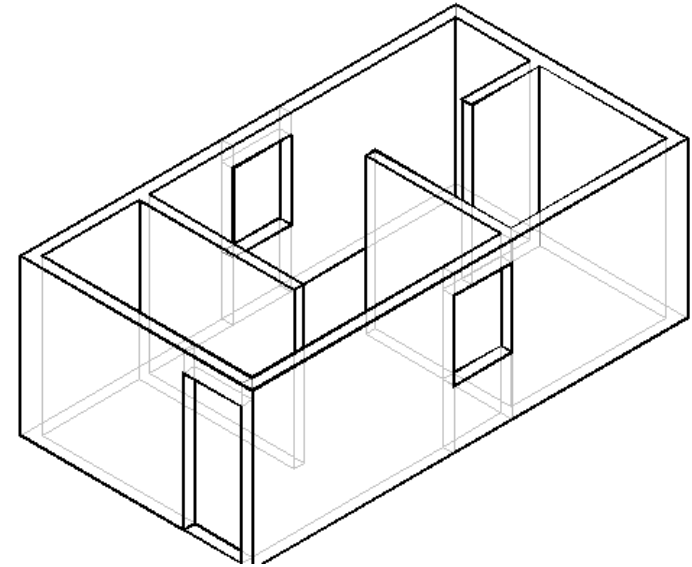
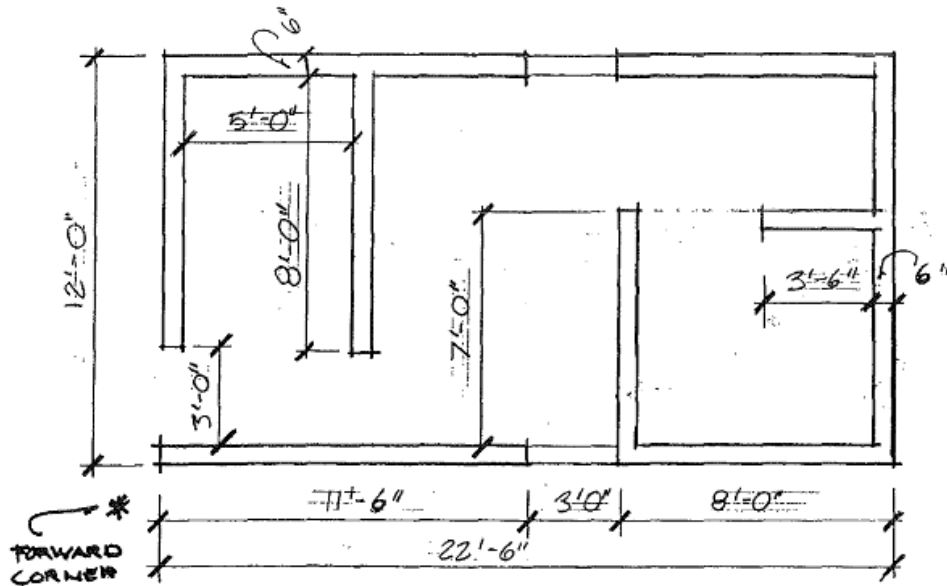


Intersection Command

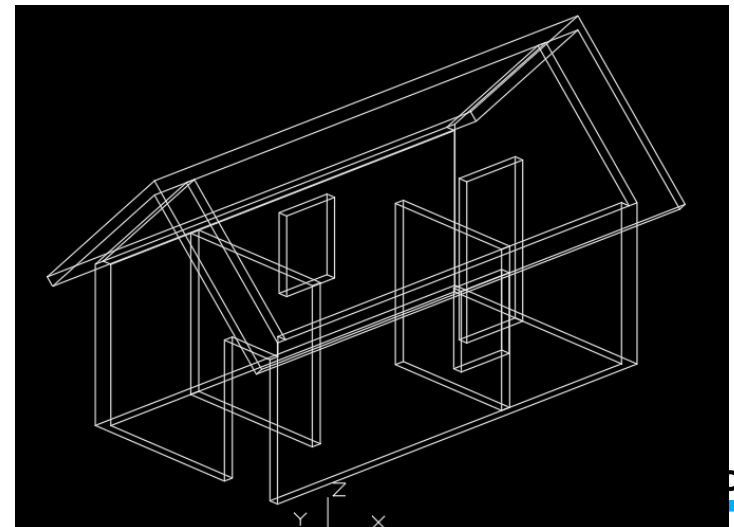
- This command creates a new solid from the intersecting volume of two or more solids or regions. AutoCAD will find the volume that all objects share and discard the rest. Here is an example of this command shown below:
- **Command: INTERSECT**
Select objects: <SELECT THE BLOCK> 1 found
Select objects: <SELECT THE CYLINDER> 1 found
Select objects: <ENTER>



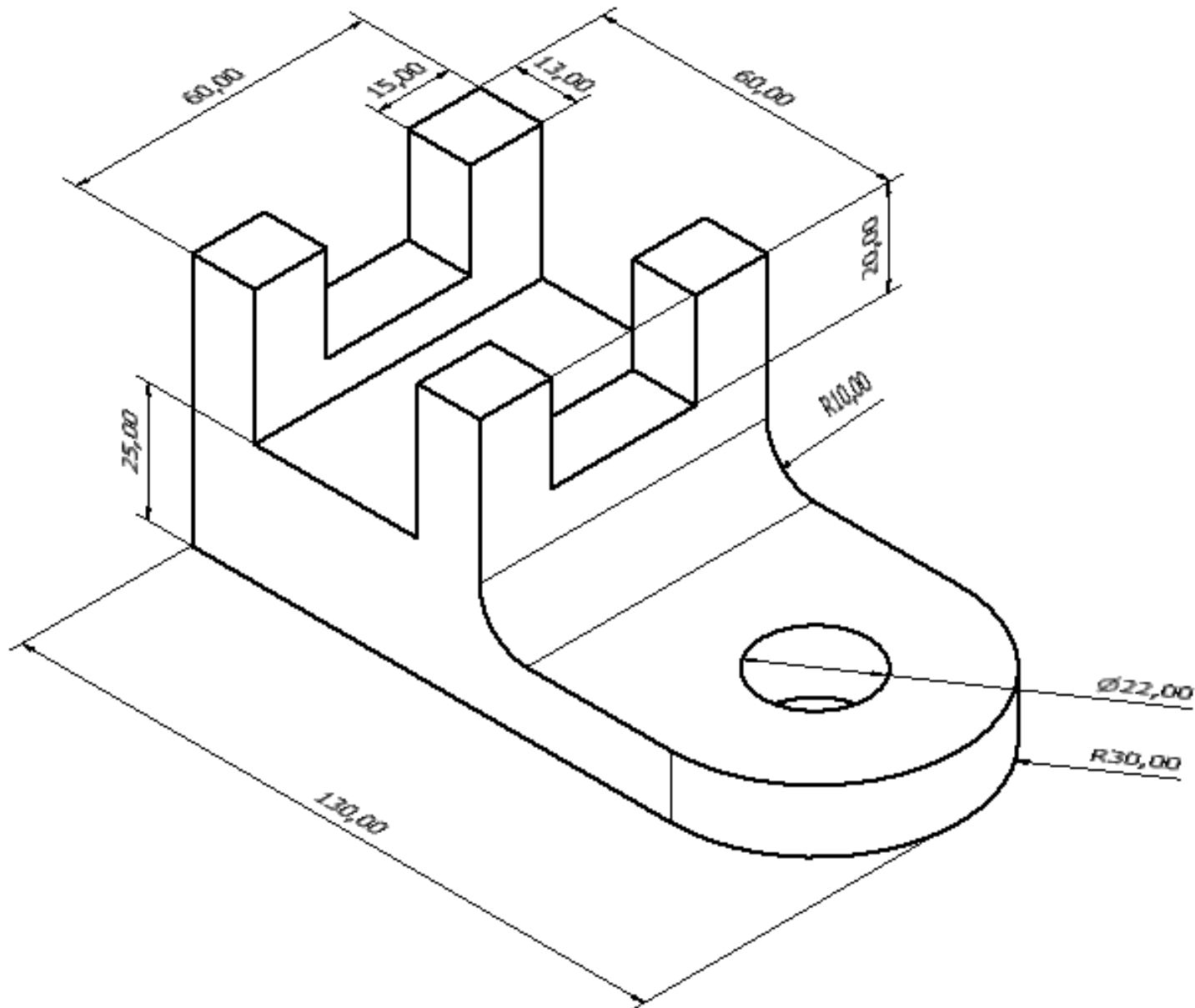
Exercise 2- little house



NOTE: ALL WINDOWS TO
BE 3'-0" FROM FLOOR
AND 1'-0" FROM CEILING.



Exercise 3- Mechanical part 1



Exercise 3- Mechanical part 2

