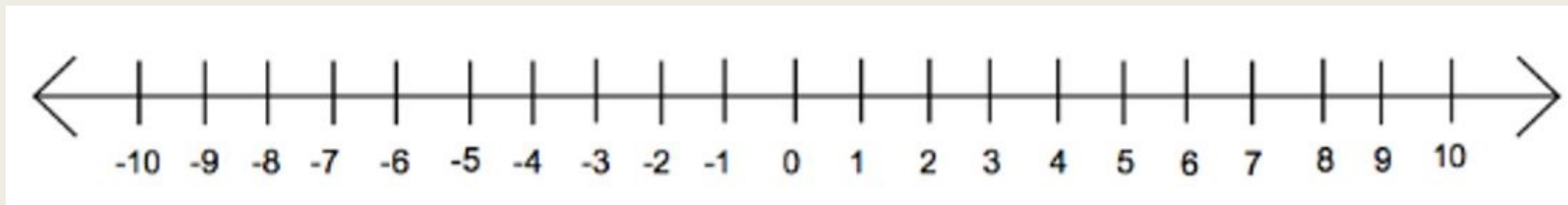# COORDINATE GEOMETRY

Chapter 4

Objective

- Have a working knowledge of coordinate system

- Understand quadrants of coordinate system

- Gain a working knowledge of machine geometry and axis orientation

Real Number System

- ■ Uses numbers 0 to 9
- ■ Can be in any combinations
  - – *2 or +2*
  - – *-3*
  - – *1/8, 1-3/16*
  - – *.185, 3.5*
- ■ All real numbers can be placed on a number line

Rectangular Coordinate System

- Cartesian Coordinate System

- A given point can be defined on a plane with two coordinate values

- A given point can be defined in space with three coordinate values

- When two number scales intersect at right angles it creates a rectangular coordinate system which makes three important terms

  1. *Axes and Planes*
  2. *Origin*
  3. *Quadrants*
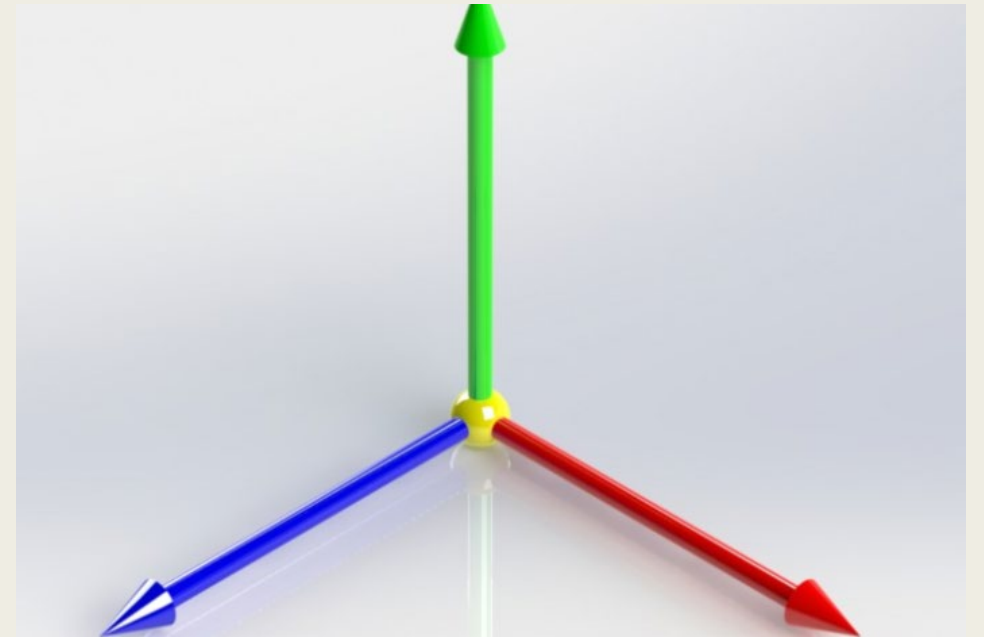 4. *Right hand coordinate system*

1. Axis and Planes

- Each major line of the number scale is an axis

- It could be in vertical or horizontal

- Axis is a reference for numbers in given direction

- Plane is a 2D entity

- It is the right angle view of two number scales

- It may vary between CAD/CAM and CNC programs
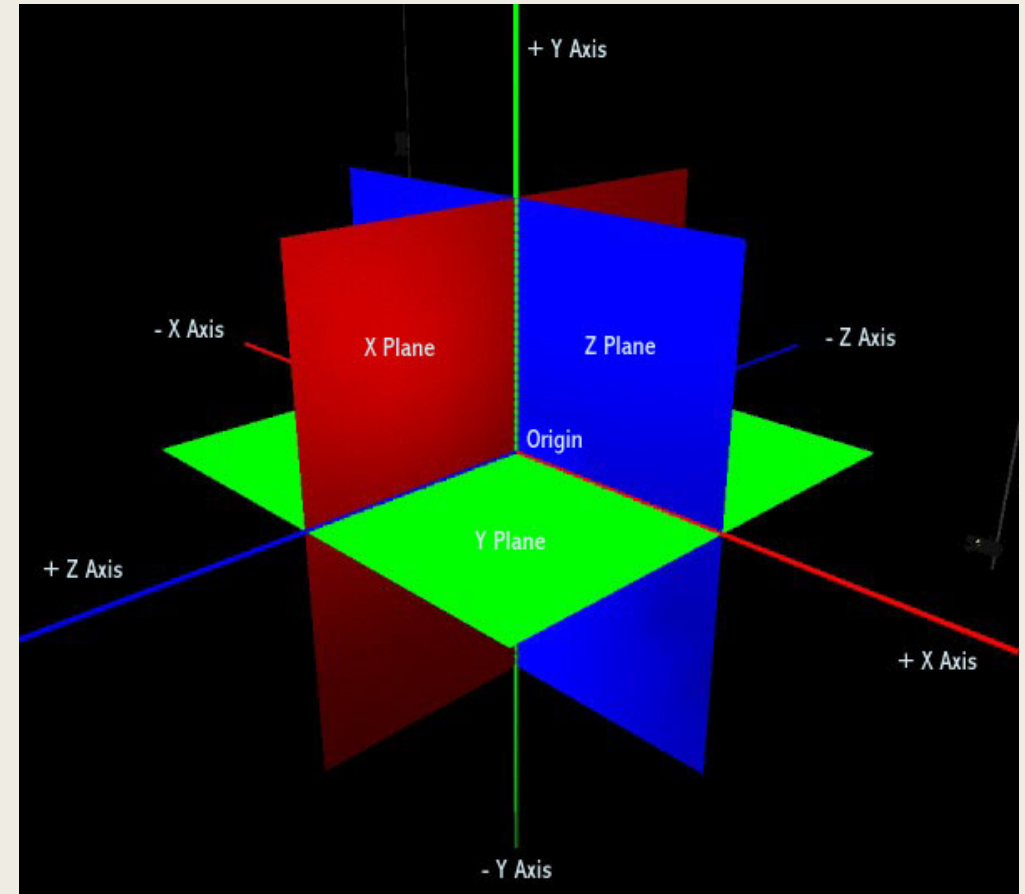
2. Origin

- An origin is the point where zero coordinates in each axis intersect

- X0Y0 on a plane - X0Y0Z0 in space

- NOTE: in CNC programming the origin is called the program reference point

 This may also differ from the CAD origin

3. Quadrants

- Quadrants are the four parts of a plane formed by a system of rectangular coordinates

- Quadrants are defined by roman numerals
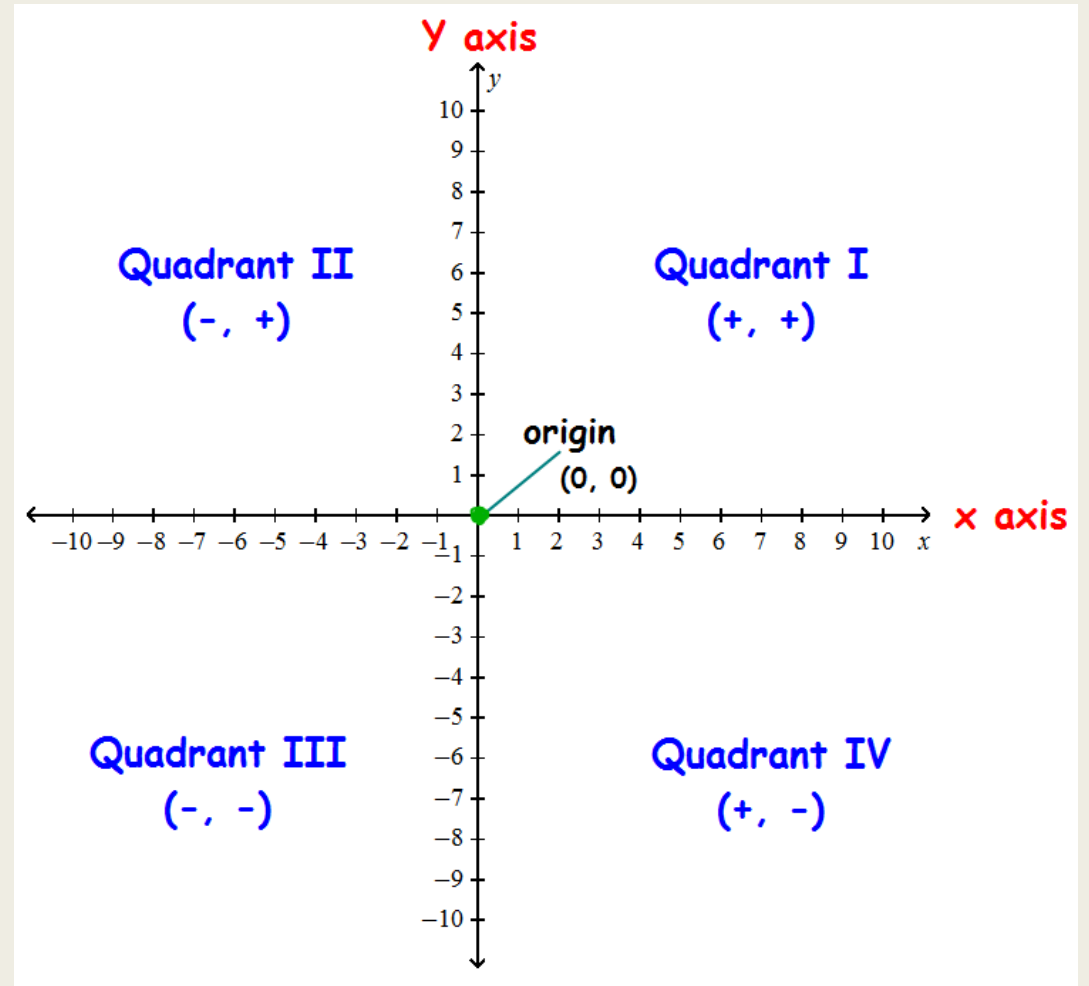
# 4. Right Hand Coordinate System

- Based on the fact that all numbers to the right and up are positive and the opposite direction are always negative

- CNC machines are normally programmed using absolute coordinate methods

- This follows that the origin in X0Y0Z0
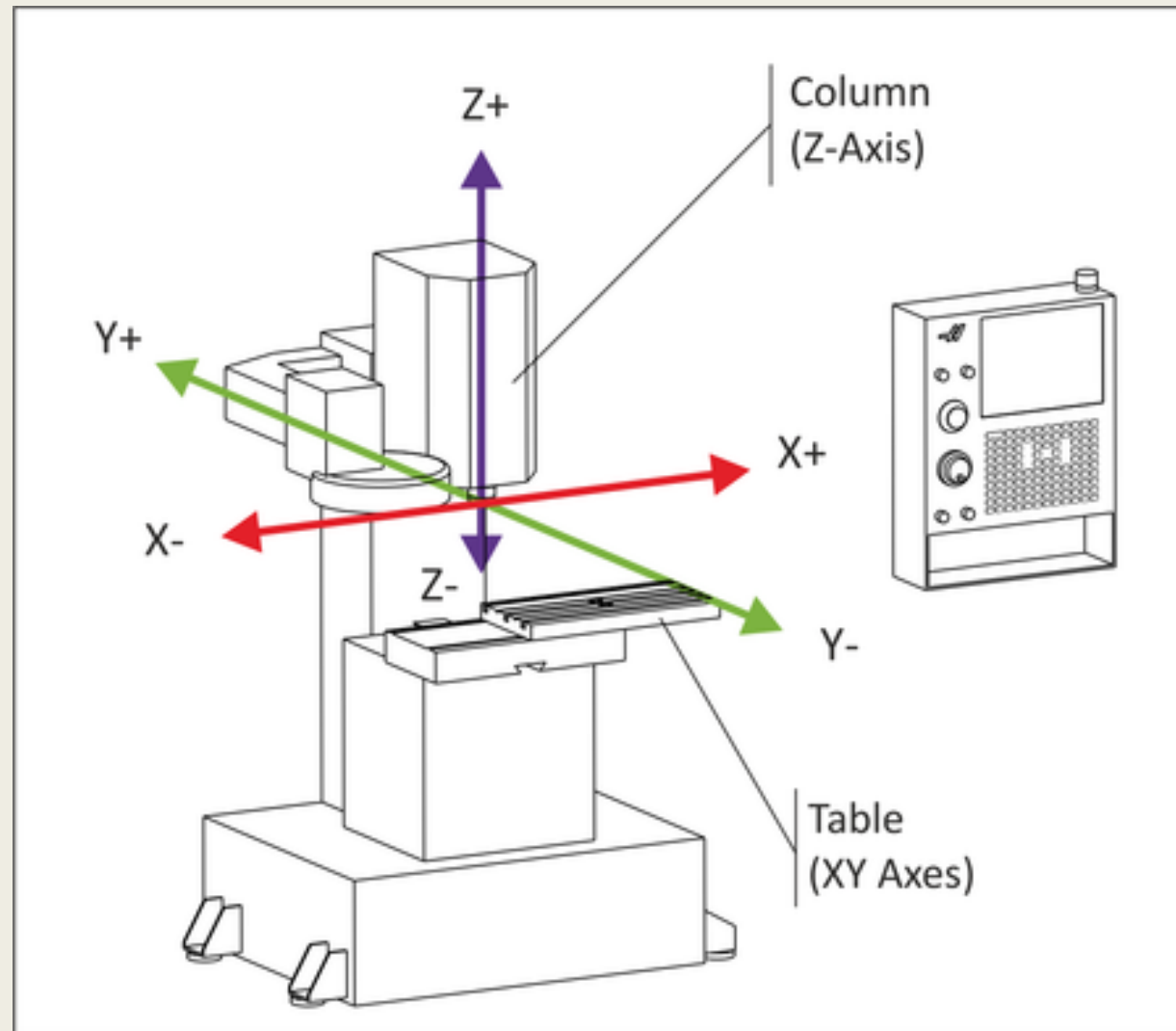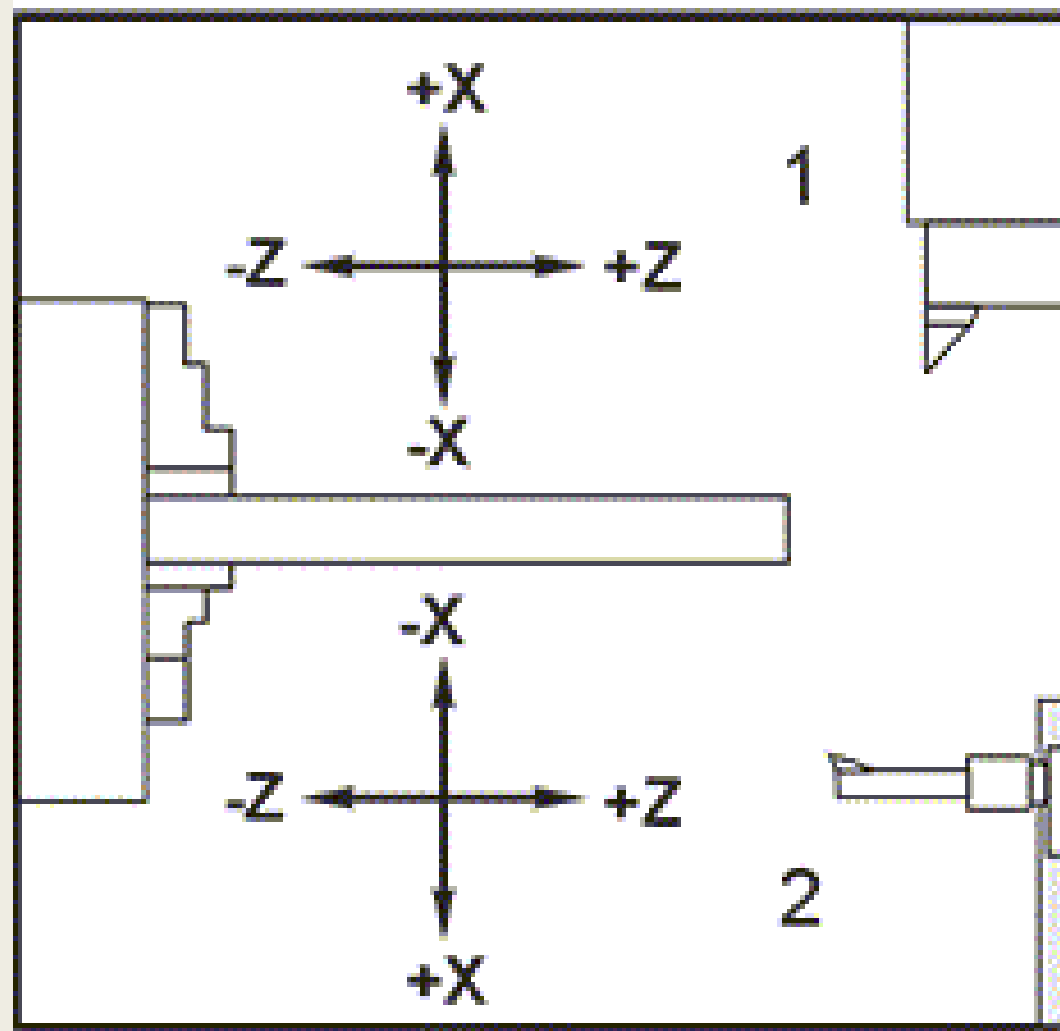
- All movements will follow this rectangular coordinate systems
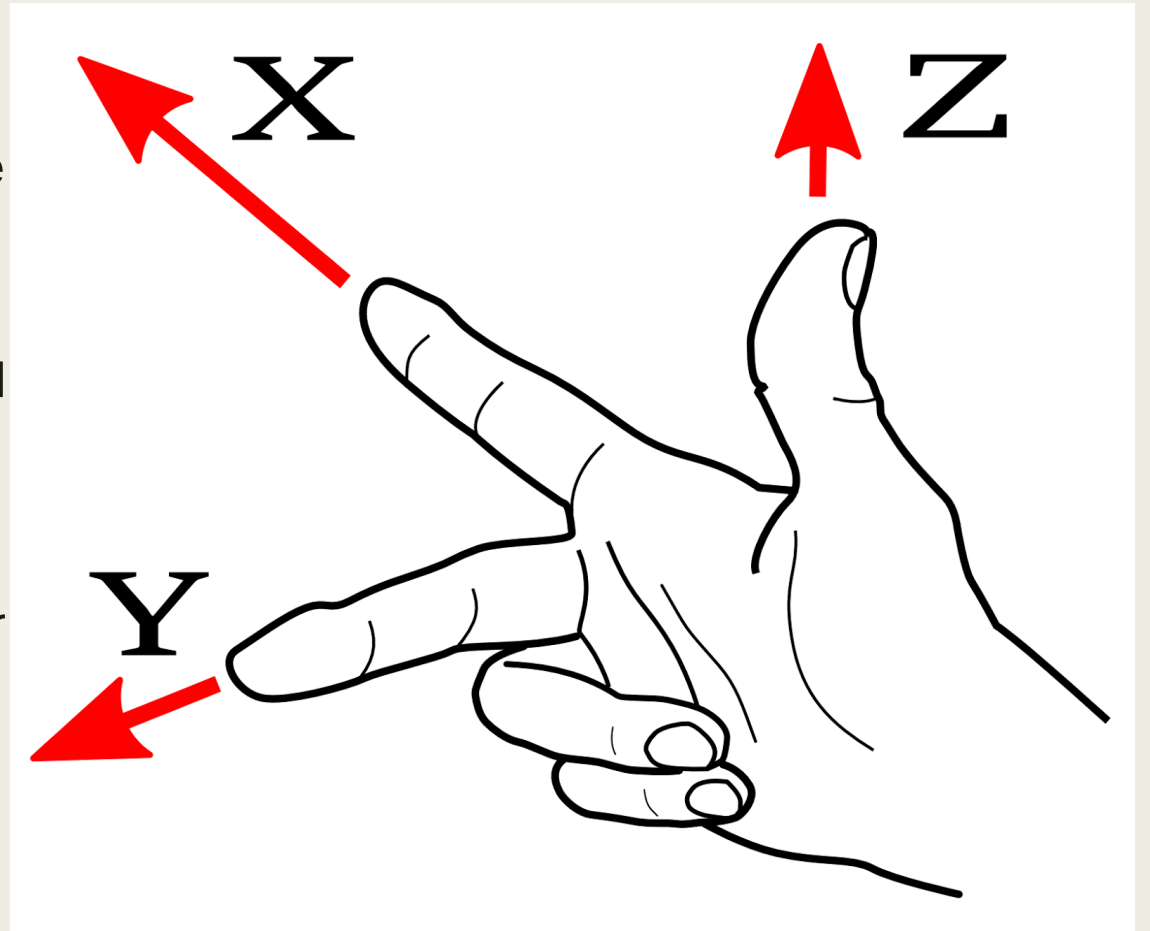
Machine Geometry

- Machines use the coordinate system

- The basic axis for machines are X, Y, and Z

- More complex machines can use U,V,W,I,J,K,A,B,C

- Typically the Z axis is the axis that could make a hole with a simple point tool
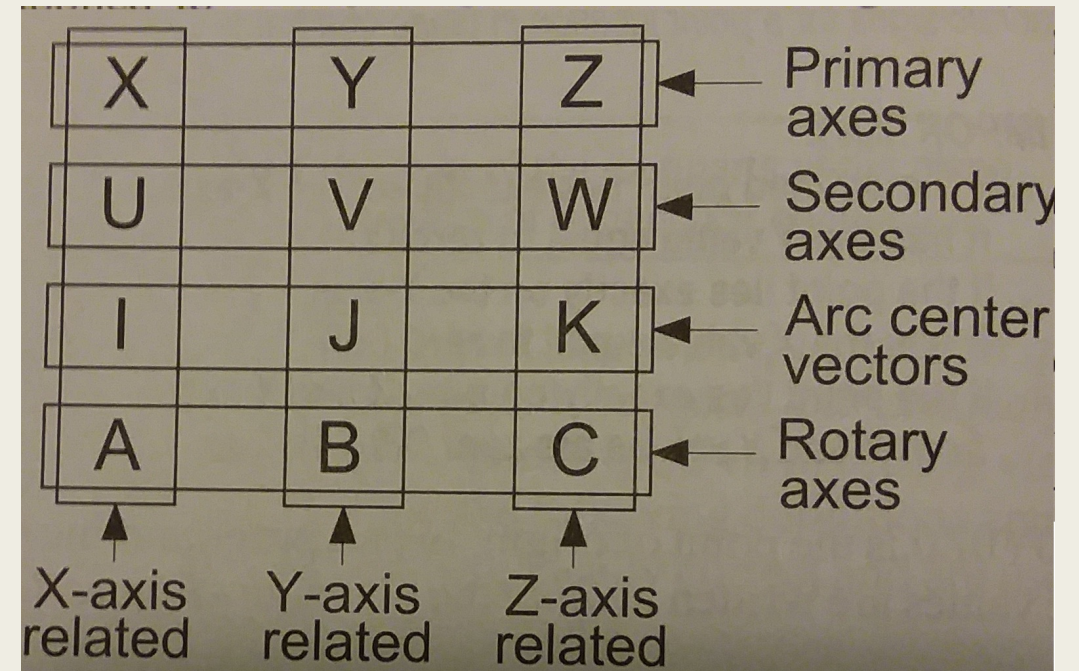
Mill Axes

Lathe Axes

Homework

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