

The background of the slide is a spiral-bound notebook with a light green, textured cover. The spiral binding is visible on the left side. The text is centered on the page.

CNC Programming III.

Circular Interpolation (Helical Motion)

Three pieces of information for Circular Interpolation

- _____ of the arc
- _____ of the arc
- _____

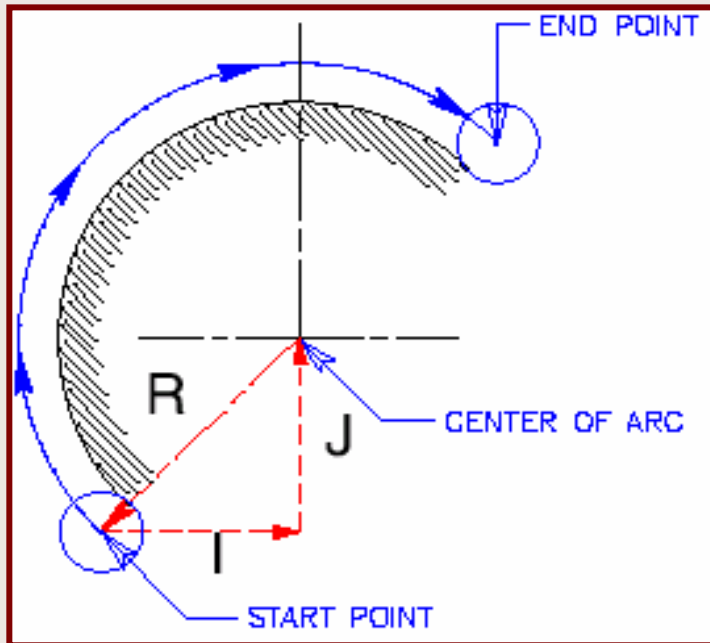
Circular Interpolation

- G02, G03, I, J & K
 - **G02**: Circular interpolation (CW)
 - **G03**: Circular interpolation (CCW)
 - **I, J & K (Use when ≤ 360 degree)**
 - Incremental distance from SP to CP of arc
 - **I**: Specifies the incremental $\pm X$ distance from the center of the tool at the start of the arc to the center of the arc.
 - **J**: Specifies the incremental $\pm Y$ distance from the center of tool at the start of the arc to the center of the arc.

Why I, J & K instead of just R?

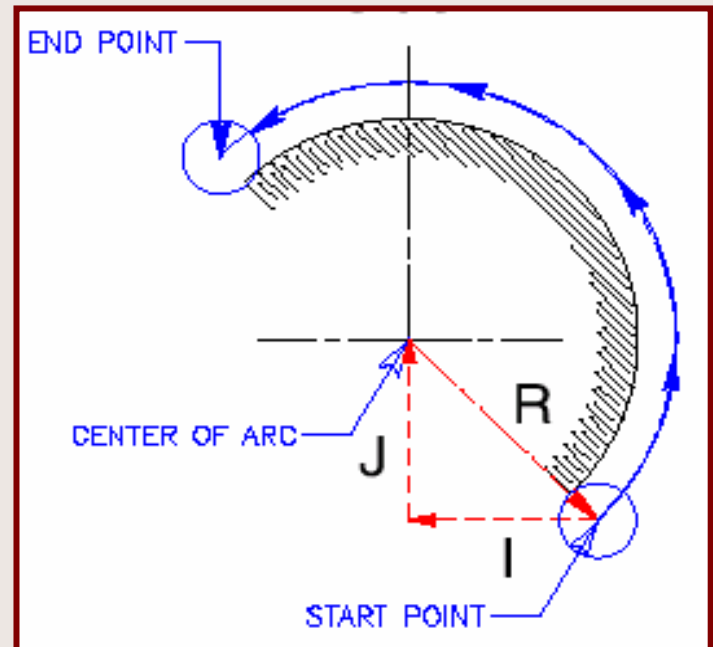
- R is easier to define, easier to make a mistake and get an incorrect radius.
- With R, the machine still do the work whether the R is correct or incorrect.
- With incorrect I, J & K, the machine will stop and gives an error message before executing.
- With R, to generate a circle path of over 180 degrees, then specify a negative R.

Relationship between I, J & R

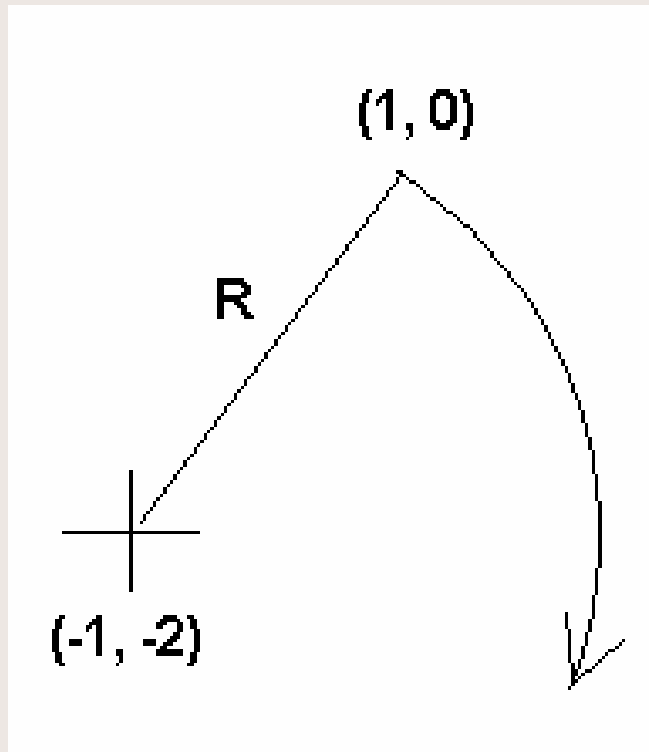


G02

G03



I & J



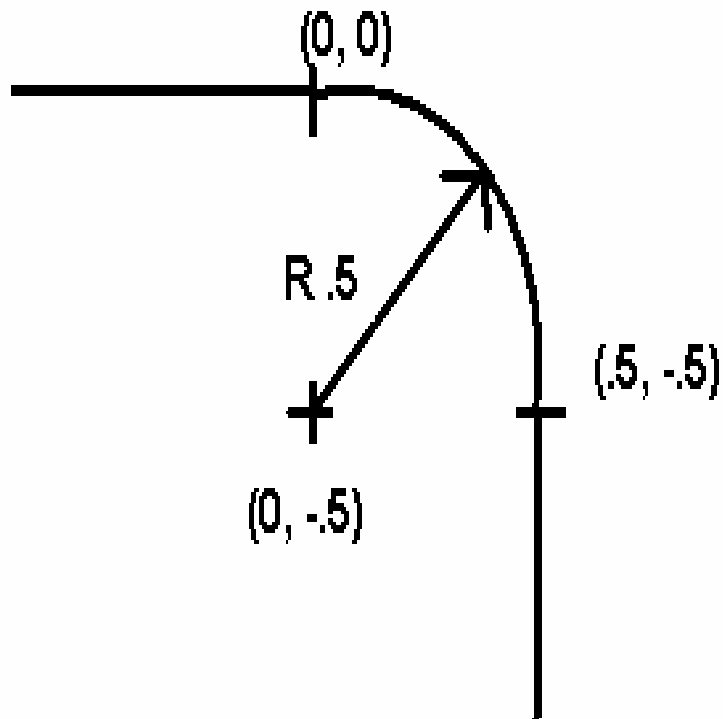
I – value?

I-2.0

J – value?

J-2.0

With 1" Dia. Tool....



Using R...

```
G1 X1. Y-.5
```

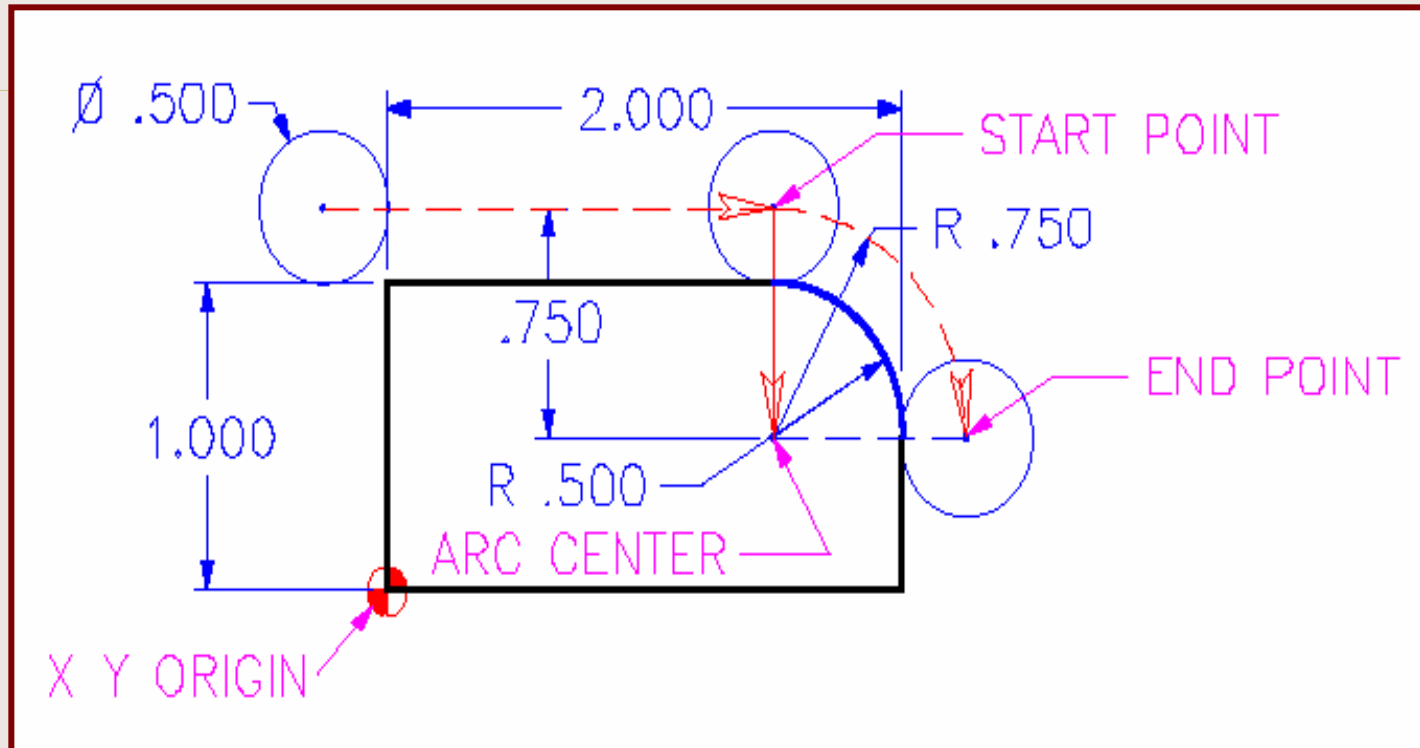
```
G3 X0. Y.5 R1.
```

Using I & J...

```
G1 X1. Y-.5
```

```
G3 X0. Y.5 I-1. J0
```

Sample program (R and J)

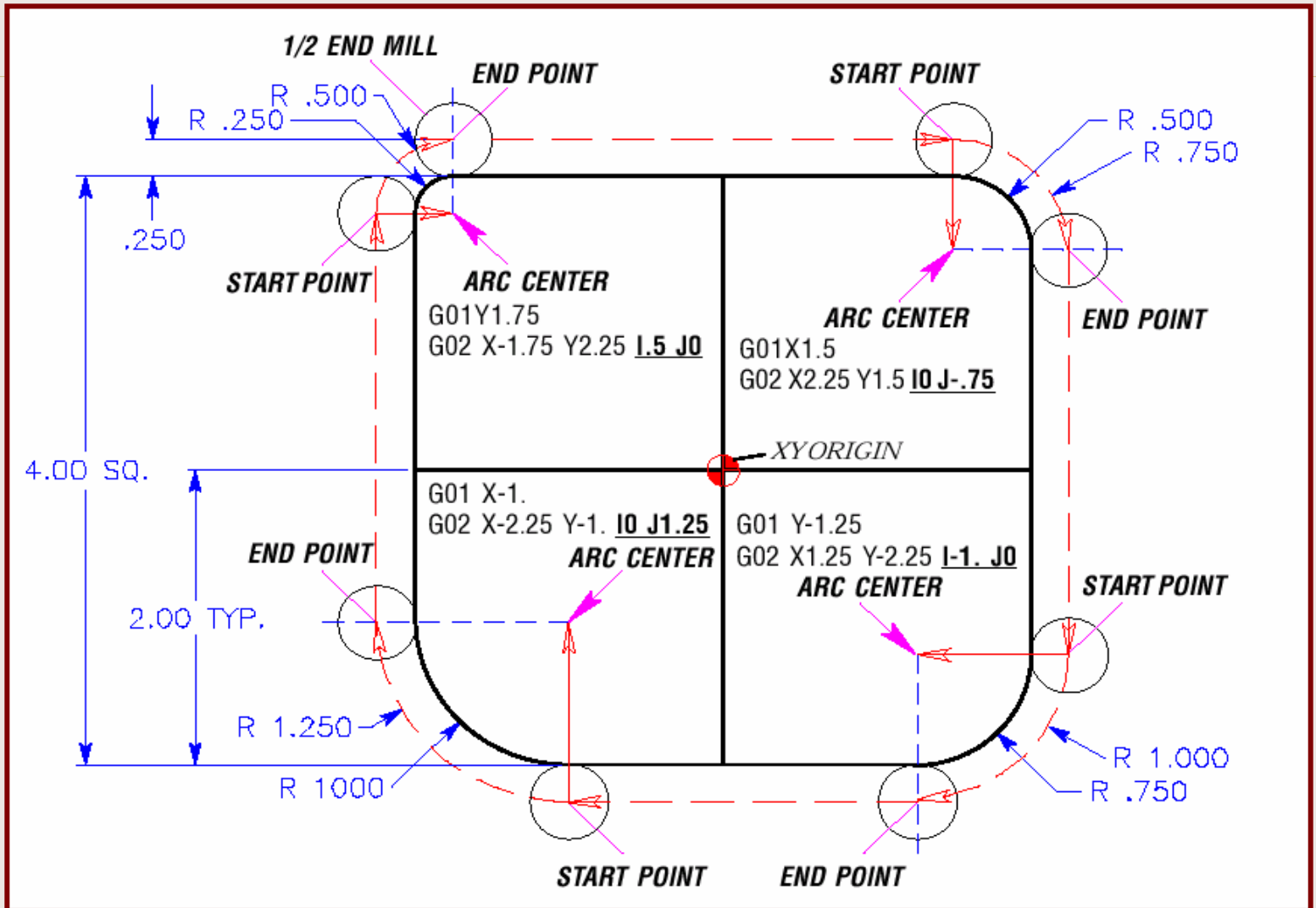


- N005 G01 Y1.250 F12.
- N006 X1.50 (to start point)
- N007 G02 X2.250 Y.50 *J-.750 I0* or *R.750*

- **Calculation:**

- **Center of Arc or Circle – (End Coordinate) = W**
- **W ± Distance from the center of arc to the center of tool;**
 - + when the tool moves to +X or +Y
 - – when the tool moves to –X or –Y
- **Example from previous slide;**
 - I => $1.5 - (2.25) = -.75, -.75 + .75 = 0$
 - J => $0.5 - (0.5) = 0, 0 - .75 = -.75$
- **[Center of Arc – (End Coordinate) +/- (Distance)]**

Sample program (I, J & K)



Assignment: Due Friday, Nov. 12th @ 12:00 p.m.

Work Piece: 5.5 x 3.5 x .5

Material: Aluminum

Tool List:

Ø0.750 3f End Mill

#4 Center Drill (Ø0.125)

Ø5/16 Twist Drill

Create dimensioned drawing of initials.

Calculate RPM & IPM for each tool

Write the program to machine the pocket and engrave initials.