In this laboratory, your group will develop four interpolation subroutines in the C language. The file names and contents are:

linint1.h : two axis linear interpolator with constant velocity
linint2.h : two axis linear interpolator with constant acceleration/deceleration
circint1.h : two axis circular interpolator with constant velocity using IJ method
circint2.h : two axis circular interpolator with constant velocity using R method

The subroutine declarations are:

void LinInt1(double Pi[2], double Pf[2], double Vr, double Pref[2]);
void LinInt2(double Pi[2], double Pf[2], double Vr, double Pref[2]);
void CircInt1(double Pi[2], double Pf[2], double Vr, double I, double J, int G, double Pref[2]);
void CircInt2(double Pi[2], double Pf[2], double Vr, double R, int G, double Pref[2]);

Inputs: initial positions (Pi[Xi,Yi]; double precision; meter), final positions (Pf[Xf,Yf]; double precision; meter), desired feedrate (Vr; double precision; meter/second), integer for clockwise (2) or counterclockwise (3) (G; int), radius (R; double precision; meter), distance between circle center and initial position in x direction (I; double precision; meter), distance between circle center and initial position in y direction (J; double precision; meter). Outputs: reference positions (Pref[Xref,Yref]; double precision; meter). Data that will be saved: reference positions (x and y), actual positions (x and y), reference velocities (x and y), and actual velocities (x and y).

If R < 0, the circle is > 180°. The acceleration/deceleration rate for LinInt2 is 50 mm/s². Use the proportional controllers you developed in Laboratory #2. Turn in the four subroutines (make sure they are well documented), the detailed subroutine designs, the expected performances via simulation, and the actual performances. Discuss your results.