

University of Massachusetts Dartmouth
Department of Electrical and Computer Engineering

ECE 161

Example program – Intersecting Lines v1.0

```
#include <stdio.h>
// Define a structure for a point, and then create a synonym
// for "struct point" called POINT
struct point
{
    double x;
    double y;
};
typedef struct point POINT;

// define a structure for line (and LINE) note it can be done in one step
typedef struct line
{
    POINT p0;
    POINT p1;
} LINE;

void main(void)
{
    LINE LineA, LineB;
    double slopeA, slopeB, yintA, yintB, xsame, ysame;

    printf("Line A:\n");
    printf("  point 0 - point x and y: ");
    scanf("%lf %lf",&LineA.p0.x, &LineA.p0.y);
    printf("  point 1 point x and y: ");
    scanf("%lf %lf", &LineA.p1.x,&LineA.p1.y);

    printf("Line B:\n");
    printf("  point 0 - x and y: ");
    scanf("%lf %lf",&LineB.p0.x, &LineB.p0.y);
    printf("  point 1 - x and y: ");
    scanf("%lf %lf", &LineB.p1.x,&LineB.p1.y);

    // m = change in y / change in x
    // y = mx + b ==> b = y-mx
    slopeA = (LineA.p1.y - LineA.p0.y)/(LineA.p1.x - LineA.p0.x);
    yintA = LineA.p0.y - slopeA * LineA.p0.x;
    slopeB = (LineB.p1.y - LineB.p0.y)/(LineB.p1.x - LineB.p0.x);
    yintB = LineB.p0.y - slopeB * LineB.p0.x;

    // if slopes are equal then lines are either parallel or co-linear - see which it is
    if (slopeA == slopeB)
    {
        if (yintA == yintB)
            printf("Lines are co-linear...all points are common\n");
        else
            printf("Lines are parallel - no points are common\n");
    }
    else
    {
        xsame = (yintB - yintA) / (slopeA - slopeB);
        ysame = slopeA * xsame + yintA;
        printf("Lines intersect at %lf, %lf\n",xsame,ysame);
    }
}
```