

C PROGRAMMING: INTERSECTING LINES

```
/* This program solves for intersection of */
/* y=ax+b and y=cx+d */
#include <stdio.h>
#include <math.h>
int main(void)
{
double a,b,c,d,x,y;
printf(" Please enter a \n");
scanf("%lf",&a);
printf(" Please enter b \n");
scanf("%lf",&b);
printf(" Please enter c \n");
scanf("%lf",&c);
printf(" Please enter d \n");
scanf("%lf",&d);
x=(d-b)/(a-c);
y=a*x+b;
printf("\n Lines intersect at %lf , %lf",x,y);
printf("\n ");
return 0;
}
```

Comments:

[1] Can you derive the formula the program is using?

[2] This program is mostly for additional practice: There is not too much new going on here as far as C is concerned. We are once again declaring variables, printing out prompts to the screen, reading numbers in, doing a little math, spitting out answers.

[3] As with the quadratic equation program, this code has a flaw in it. Does anyone see it? (Answer: you will divide by zero if $a = c$.)

[4] What is the geometric significance of the bug? (Answer: the lines are parallel and do not intersect.)

[5] Since this program is fairly easy, here's a challenge: Can you use the `if () { } else { }` structure from your second quadratic equation program to fix the flaw?

[6] Actually, there is a third case your code needs to deal with besides just $a = c$. What if $a = c$ and $b = d$ also? What is the geometric significance and what is the nature of the solution? (Answers: the lines are identical and there are an infinite number of intersections.) Can you write a program to deal with all three cases? (You may need to construct an if statement with three possibilities instead of two.)