CSC2340 Object-Oriented Programming
Professor: Zhang **P1 Line**

Write a Java program to implement a class called Line which represents a geometric line and then test the Line class using the sample program given below.

A Line is defined by the equation $ax + by + c = 0$, where a is not equal to zero, b is not equal to zero, and a, b, and c are all integers. The slope of a Line is defined to be the double value $-a/b$, since it can be rewritten as a slope-intercept linear equation $y = -\frac{a}{b}x - \frac{c}{b}$. A point (represented by integers x and y) is on a Line if the equation of the Line is satisfied when those x and y values are substituted into the equation. That is, a point represented by x and y is on the line if $ax + by + c$ is equal to 0. Examples of two Line equations are shown in the following table.

Equation	Slope ($-a/b$)	Is point $(5, -2)$ on the line?
$5x + 4y - 17 = 0$	$-5/4 = -1.25$	Yes, because $5(5) + 4(-2) + (-17) = 0$
$-25x + 40y + 30 = 0$	$25/40 = 0.625$	No, because $-25(5) + 40(-2) + 30 \neq 0$

The code segment shows an example of using the Line class to represent the two equations shown in the table. Add some output statements to print out slopes of the lines, whether or not the point is on the lines, and if the two lines are parallel.

```
Line line1 = new Line(5, 4, -17);
double slope1 = line1.getSlope();
boolean onLine1 = line1.isOnLine(5, -2);

Line  line2 = new Line(-25, 40, 30);
double slope2 = line2.getSlope();
boolean onLine2 = line2.isOnLine(5, -2);

Line line3 = new Line(5, 4, 28);
boolean isParallel12 = line1.isParallel(line2);
boolean isParallel13 = line1.isParallel(line3);
```

You may assume that the values of the parameters representing a and b are not zero. It must also include a method getSlope that calculates and returns the slope of a line, a method isOnLine that returns true if the point with x and y coordinates is on the line and false otherwise, and a method isParallel.