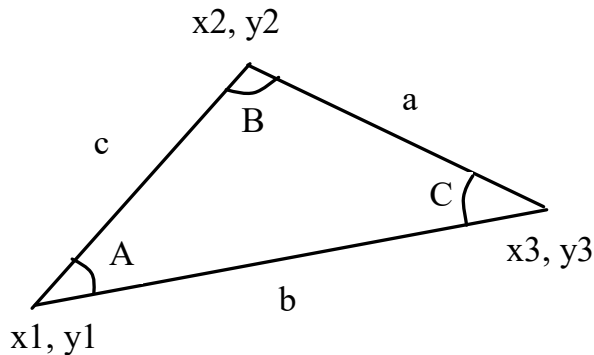


# Hands-on activities 1

Mathematical functions, strings, loops



- Write a program that prompts the user to enter the x- and y-coordinates of the three corner points in a triangle
- Displays the triangle's angles and area.
- Display an error message is the three points are collinear.



$$A = \arccos((a * a - b * b - c * c) / (-2 * b * c))$$
$$B = \arccos((b * b - a * a - c * c) / (-2 * a * c))$$
$$C = \arccos((c * c - b * b - a * a) / (-2 * a * b))$$

- The Monte Carlo simulation refers to a technique that uses random numbers and probability to solve problems.
- This method has a wide range of applications in computational mathematics, physics, chemistry, and finance
- Example - approximating  $\pi$
- Idea:
  - $\text{circleArea} = \pi$
  - $\text{squareArea} = 4$
  - $\Rightarrow$ 
    - $\text{circleArea} / \text{squareArea} = \pi / 4$  or
    - $\pi = 4 \text{ circleArea} / \text{squareArea}$
- $\pi$  can be approximated by
  - $4 * \text{numberOfHits} / \text{numberOfTrials}$
- Write a program that approximates  $\pi$

