Suppose we have a triangle with one vertex at the origin. We can express two sides of the triangle as vectors \(|\vec{u}| = (a, b)\) and \(|\vec{v}| = (c, d)\).

We wish to write the area of the triangle in terms of \(a, b, c, d\)

1. Write the area of the triangle using \(\sin \theta\), \(|\vec{u}|\) and \(|\vec{v}|\)
2. Find the direction of \(\vec{u}\). That is, find \(\theta_u\) in terms of \(a\) and \(b\)
3. Find the direction of \(\vec{v}\). That is, find \(\theta_v\) in terms of \(c\) and \(d\)
4. Express \(\theta\) in terms of \(\theta_u\) and \(\theta_v\)
5. Express \(\sin \theta\) using inverse trig functions and \(a, b, c, d\)
6. Use the angle sum/difference formula to write \(\sin \theta\) in terms of \(a, b, c, d\)
7. Write the area of the triangle in terms of \(a, b, c, d\)
8. If \(\vec{u} = (5, 1)\) and \(\vec{v} = (4, -2)\), find the area.
9. If \(\vec{u} = (4, -2)\) and \(\vec{v} = (5, 1)\), find the area. Do you need to adjust the formula?