To determine if a given point  lies in the interior of a given triangle, consider an individual vertex, denoted , and let  and  be the vectors from  to the other two vertices. Expressing the vector from  to  in terms of  and  then gives

|  |  |
| --- | --- |
|  | (1) |

where  and  are constants. Solving for  and  gives

|  |  |  |  |
| --- | --- | --- | --- |
|  |  |  | (2) |
|  |  |  | (3) |

where

|  |  |
| --- | --- |
|  | (4) |

is the [determinant](https://mathworld.wolfram.com/Determinant.html) of the matrix formed from the [column vectors](https://mathworld.wolfram.com/ColumnVector.html)  and . Then the point  lies in the interior of the triangle if  and .

If the [convex hull](https://mathworld.wolfram.com/ConvexHull.html) of the triangle vertices plus the point  is bounded by four points, the point  lies outside the triangle. However, if it contains three points, the point  may lie either in the interior or in the exterior.