Question

(a) Find the area of the triangle at $(1, 2, 3)$, $(3, 2, 1)$, $(2, 3, 1)$.

(b) Find the equation of the plane containing the above triangle.

Answer

(a) $A = (1, 2, 3)$, $B = (3, 2, 1)$, $C = (2, 3, 1)$.

$\vec{AB} = (2, 0, -2)$ $\vec{AC} = (1, 1 - 2)$ $\vec{AB} \times \vec{AC} = (2, 2, 2)$

Area of triangle $ABC = \frac{1}{2}|AB \times AC| = \frac{1}{2}\sqrt{12} = \sqrt{3}$

(b) $AB \times AC$ is normal to the plane ABC, so its equation is $2x+2y+2z = k$.

It contains $(1, 2, 3)$ so $k = 12$

Therefore $x + y + z = 6$