

Given that points the points x, y and z Have coordinates (5,6,1) (2,1,3) and (3,5,-2) find angle yxz.

### Solution

Find coordinates of  $\overline{YX}$  and  $\overline{ZX}$ :

$$\overline{YX} = (5-2;6-1;1-3) = (3;5;-2).$$

$$\overline{ZX} = (5-3;6-5;1-(-2)) = (2;1;3).$$

Use geometric definition of scalar product:

$$\overline{YX} * \overline{ZX} = |\overline{YX}| * |\overline{ZX}| * \cos \angle YXZ.$$

$$\cos \angle YXZ = \frac{\overline{YX} * \overline{ZX}}{|\overline{YX}| * |\overline{ZX}|} = \frac{3*2+5*1+(-2)*3}{\sqrt{3^2+5^2+(-2)^2} * \sqrt{2^2+1^2+3^2}} = \frac{5}{\sqrt{38} * \sqrt{14}} = \frac{5}{\sqrt{19*2*7*2}} = \frac{5}{2\sqrt{133}} = \frac{5\sqrt{133}}{266}.$$

$$\angle YXZ = \arccos\left(\frac{5\sqrt{133}}{266}\right).$$

$$\text{Answer: } \arccos\left(\frac{5\sqrt{133}}{266}\right).$$

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