VKM/IM 2017/2018

Nalezněte jednotkový vektor kolmý k zadaným vektorům u, v. Spočtěte velikost úhlu, který vektory u, v svírají.

(1) $\boldsymbol{u} = [-1, 1, 0]$, $\boldsymbol{v} = [4, 1, 1]$.

(2) $\boldsymbol{u} = [0, 2, -2]$, $\boldsymbol{v} = [3, 3, 0]$.

(3) $\boldsymbol{u} = [1, 3, 2]$, $\boldsymbol{v} = [1, 0, 3]$.

(4) $\boldsymbol{u} = [0, -2, 3]$, $\boldsymbol{v} = [2, 0, -1]$.

(5) $\boldsymbol{u} = [3, -1, -3]$, $\boldsymbol{v} = [2, 3, 1]$.

(6) $\boldsymbol{u} = [1, 2, -3]$, $\boldsymbol{v} = [3, -1, -2]$.

(7) $\boldsymbol{u} = [1, 1, -2]$, $\boldsymbol{v} = [1, -2, 1]$.

(8) $\boldsymbol{u} = [2, 1, 2]$, $\boldsymbol{v} = [1, 4, 1]$.

(9) $\boldsymbol{u} = [-2, 1, 3]$, $\boldsymbol{v} = [2, -1, 1]$.

(10) $\boldsymbol{u} = [0, -2, 2]$, $\boldsymbol{v} = [2, 1, 1]$.

(11) $\boldsymbol{u} = [1, 2, 3]$, $\boldsymbol{v} = [3, 2, 1]$.

(12) $\boldsymbol{u} = [0, 1, -3]$, $\boldsymbol{v} = [0, 2, -1]$.

(13) $\boldsymbol{u} = [1, 0, 2]$, $\boldsymbol{v} = [1, 0, 3]$.

(14) $\boldsymbol{u} = [1, 1, 2]$, $\boldsymbol{v} = [1, 0, 1]$.

(15) $\boldsymbol{u} = [2, 1, 2]$, $\boldsymbol{v} = [4, -1, 1]$.

(16) $\boldsymbol{u} = [0, -2, 2]$, $\boldsymbol{v} = [2, 0, -1]$.

(17) $\boldsymbol{u} = [1, 1, 0]$, $\boldsymbol{v} = [1, 2, 2]$.

(18) $\boldsymbol{u} = [-1, 0, 3]$, $\boldsymbol{v} = [3, -1, 0]$.

(19) $\boldsymbol{u} = [1, 0, 2]$, $\boldsymbol{v} = [1, 3, 0]$.

(20) $\boldsymbol{u} = [2, 2, 0]$, $\boldsymbol{v} = [1, 2, -2]$.

(21) $\boldsymbol{u} = [1, 1, 0]$, $\boldsymbol{v} = [2, 1, 1]$.

(22) $\boldsymbol{u} = [5, 5, 2]$, $\boldsymbol{v} = [1, 4, 1]$.

(23) $\boldsymbol{u} = [2, -1, 2]$, $\boldsymbol{v} = [1, 4, 1]$.

(24) $\boldsymbol{u} = [2, 1, 1]$, $\boldsymbol{v} = [3, 5, 4]$.

(25) $\boldsymbol{u} = [0, 3, 2]$, $\boldsymbol{v} = [1, -2, 3]$.

(26) $\boldsymbol{u} = [0, 2, 3]$, $\boldsymbol{v} = [3, 0, 1]$.

(27) $\boldsymbol{u} = [0, -3, 2]$, $\boldsymbol{v} = [1, -2, 1]$.

(28) $\boldsymbol{u} = [-2, 0, 3]$, $\boldsymbol{v} = [2, 1, 1]$.

(29) $\boldsymbol{u} = [1, 1, -2]$, $\boldsymbol{v} = [1, 2, 1]$.

(30) $\boldsymbol{u} = [1, 1, -2]$, $\boldsymbol{v} = [1, 0, 1]$.

Nalezněte jednotkový vektor kolmý k zadaným vektorům u, v. Spočtěte velikost úhlu, který vektory u, v svírají.

(1) $\boldsymbol{w}_n = \frac{1}{3\sqrt{3}}\,[1,1,-5]\,, \quad \varphi = 2.0944 \cong 120^\circ.$

(2) $\boldsymbol{w}_n = \frac{1}{\sqrt{3}}\,[1,-1,-1]\,, \quad \varphi = 1.0472 \cong 60^\circ.$

(3) $\boldsymbol{w}_n = \frac{1}{\sqrt{91}}\,[9,-1,-3]\,, \quad \varphi = 0.937744 \cong 53^\circ 43' 43''.$

(4) $\boldsymbol{w}_n = \frac{1}{\sqrt{14}}\,[1,3,2]\,, \quad \varphi = 1.95207 \cong 111^\circ 50' 43.6115''.$

(5) $\boldsymbol{w}_n = \frac{1}{\sqrt{266}}\,[8,-9,11]\,, \quad \varphi = 1.5708 \cong 90^\circ.$

(6) $\boldsymbol{w}_n = -\frac{1}{\sqrt{3}}\,[1,1,1]\,, \quad \varphi = 1.0472 \cong 60^\circ.$

(7) $\boldsymbol{w}_n = -\frac{1}{\sqrt{3}}\,[1,1,1]\,, \quad \varphi = 2.0944 \cong 120^\circ.$

(8) $\boldsymbol{w}_n = \frac{1}{\sqrt{2}}\,[-1,0,1]\,, \quad \varphi = 0.891123 \cong 51^\circ 3' 27''.$

(9) $\boldsymbol{w}_n = \frac{1}{\sqrt{5}}\,[1,2,0]\,, \quad \varphi = 1.79078 \cong 102^\circ 36' 15''.$

(10) $\boldsymbol{w}_n = \frac{1}{\sqrt{3}}\,[-1,1,1]\,, \quad \varphi = 1.5708 \cong 90^\circ 0' 0.0''.$

(11) $\boldsymbol{w}_n = \frac{1}{\sqrt{6}}\,[-1,2,-1]\,, \quad \varphi = 0.775193 \cong 44^\circ 24' 55.1109''.$

(12) $\boldsymbol{w}_n = [1,0,0]\,, \quad \varphi = 0.785398 \cong 45^\circ.$

(13) $\boldsymbol{w}_n = [0,-1,0]\,, \quad \varphi = 0.141897 \cong 8^\circ 7' 48.3685''.$

(14) $\boldsymbol{w}_n = \frac{1}{\sqrt{3}}\,[1,1,-1]\,, \quad \varphi = 0.523599 \cong 30^\circ.$

(15) $\boldsymbol{w}_n = \left[\frac{1}{3}, \frac{2}{3}, -\frac{2}{3}\right], \quad \varphi = 0.785398 \cong 45^\circ.$

(16) $\boldsymbol{w}_n = \left[\frac{1}{3}, \frac{2}{3}, \frac{2}{3}\right], \quad \varphi = 1.89255 \cong 108^\circ 26' 5.815\,76''.$

(17) $\boldsymbol{w}_n = \left[\frac{2}{3}, -\frac{2}{3}, \frac{1}{3}\right], \quad \varphi = 0.785398 \cong 45^\circ.$

(18) $\boldsymbol{w}_n = \frac{1}{\sqrt{91}}\,[3, 9, 1], \quad \varphi = 1.87549 \cong 107^\circ 27' 27''.$

(19) $\boldsymbol{w}_n = \frac{1}{7}\,[-6, 2, 3], \quad \varphi = 1.4289 \cong 81^\circ 52' 11.6315''.$

(20) $\boldsymbol{w}_n = \frac{1}{3}\,[-2, 2, 1], \quad \varphi = 0.785398 \cong 45^\circ.$

(21) $\boldsymbol{w}_n = \frac{1}{\sqrt{3}}\,[1, -1, -1], \quad \varphi = 0.523599 \cong 30^\circ.$

(22) $\boldsymbol{w}_n = \frac{1}{3\sqrt{3}}\,[-1, -1, 5], \quad \varphi = 0.523599 \cong 30^\circ.$

(23) $\boldsymbol{w}_n = \frac{1}{\sqrt{2}}\,[-1, 0, 1], \quad \varphi = 1.5708 \cong 90^\circ.$

(24) $\boldsymbol{w}_n = \frac{1}{5\sqrt{3}}\,[-1, -5, 7], \quad \varphi = 0.523599 \cong 30^\circ.$

(25) $\boldsymbol{w}_n = \frac{1}{\sqrt{182}}\,[13, 2, -3], \quad \varphi = 1.5708 \cong 90^\circ.$

(26) $\boldsymbol{w}_n = \frac{1}{11}\,[2, 9, -6], \quad \varphi = 1.30454 \cong 74^\circ 44' 41.5727''.$

(27) $\boldsymbol{w}_n = \frac{1}{\sqrt{14}}\,[1, 2, 3], \quad \varphi = 0.437481 \cong 25^\circ 3' 56.9852''.$

(28) $\boldsymbol{w}_n = \frac{1}{\sqrt{77}}\,[-3, 8, -2], \quad \varphi = 1.68427 \cong 96^\circ 30' 5''.$

(29) $\boldsymbol{w}_n = \frac{1}{\sqrt{35}}\,[5, -3, 1], \quad \varphi = 1.40335 \cong 80^\circ 24' 21''.$

(30) $\boldsymbol{w}_n = \frac{1}{\sqrt{11}}\,[1, -3, -1], \quad \varphi = 1.86364 \cong 106^\circ 46' 43''.$