# Lösungen T E+M Alg 1 05 1

## 1

```
vO={0,0,0};vA={4,3,0};vB={6,5,0};vC={2,8,0};
{Cross[vA,vB],Cross[vB,vC],Cross[vC,vA],Cross[vA,vB]+Cross[vB,vC]+Cross[vC,vA]}
```

```
{{0, 0, 2}, {0, 0, 38}, {0, 0, -26}, {0, 0, 14}}
```

Umlausinn ändern: Negativ

## 2

```
k1={1,5,6};k1=k1/Norm[k1];k2={2,5,7};k2=k2/Norm[k1];k1+k2
```

$$\left\{2+\frac{1}{\sqrt{62}},\ 5+\frac{5}{\sqrt{62}},\ 7+3\sqrt{\frac{2}{31}}\right\}$$

```
%//N
```

```
{2.127, 5.635, 7.762}
```

```
a={3,1,0};b={0,2,1};c={1,0,4};
solv=Solve[k1+k2 == λ a + μ b + ν c, {λ,μ,ν}] //Flatten
```

$$\left\{\lambda\to\frac{434+\sqrt{62}}{1550},\ \mu\to\frac{1}{25}\left(59+\sqrt{62}\right),\ \nu\to\frac{1}{775}\left(899+11\sqrt{62}\right)\right\}$$

```
%//N
```

```
{λ → 0.28508, μ → 2.67496, ν → 1.27176}
```

```
λ a/.solv[[1]]
```

$$\left\{\frac{3\left(434+\sqrt{62}\right)}{1550},\ \frac{434+\sqrt{62}}{1550},\ 0\right\}$$

```
%//N
```

```
{0.85524, 0.28508, 0.}
```

```
Norm[%]
```

```
0.901502
```

```
Norm[%%%]
```

$$\frac{434+\sqrt{62}}{155\sqrt{10}}$$

# 3

## a

```
vA={1,5,6};vB={2,5,7};vC={3,1,0};vD={1,0,4};

V=Det[{vB-vA,vC-vA,vD-vA}]/6
```

$$-\frac{16}{3}$$

```
N[%]
```

```
-5.33333
```

## b

```
(Norm[Cross[vB-vA,vD-vA]]+Norm[Cross[vC-vB,vD-vB]]+Norm[Cross[vB-vA,vC-vA]]+Norm[Cross[vC-vA,vD-vA]])/2
```

$$\frac{1}{2}\left(17\sqrt{6}+\sqrt{710}\right)$$

```
N[%]
```

```
34.1436
```

## c

```
winkel=ArcCos[(vA-vB).(vC-vB)/(Norm[vA-vB] Norm[vC-vB])]
```

$$\text{ArcCos}\left[\sqrt{\frac{3}{11}}\right]$$

```
%//N
```

```
1.02133
```

```
%/Degree
```

```
58.5178
```

# 4

## a

```
vA={4,5,-6};vB={6,2,-5};vC={2,16,1};
vX[λ_]:=vB+λ(vC-vB);
(vC-vB).(vA-vX[λ])==0
```

$$14\,(3-14\,\lambda)+6\,(-1-6\,\lambda)-4\,(-2+4\,\lambda)==0$$

```
solv= Solve[(vC-vB).(vA-vX[λ])==0,{λ}]//Flatten
```

$$\left\{\lambda\to\frac{11}{62}\right\}$$

```
%//N
```

$$\{\lambda\to 0.177419\}$$

```
vX0=vX[λ]/.solv
```

$$\left\{\frac{164}{31},\ \frac{139}{31},\ -\frac{122}{31}\right\}$$

```
%//N
```

$$\{5.29032,\ 4.48387,\ -3.93548\}$$

## b ==> ausserhalb - x-Koordinaten vergleichen....

```
g[μ_]:=vA+ μ (vA-vX0);
g[μ][[3]]==0
```

$$-6-\frac{64\,\mu}{31}==0$$

```
solv=Solve[g[μ][[3]]==0,{μ}]//Flatten
```

$$\left\{\mu\to-\frac{93}{32}\right\}$$

```
g[μ]/.solv
```

$$\left\{\frac{31}{4},\ \frac{7}{2},\ 0\right\}$$

```
%//N
```

$$\{7.75,\ 3.5,\ 0.\}$$