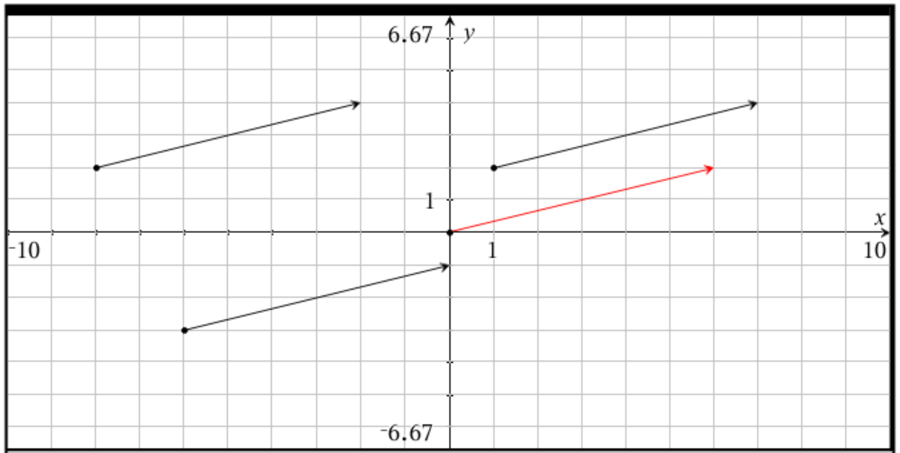
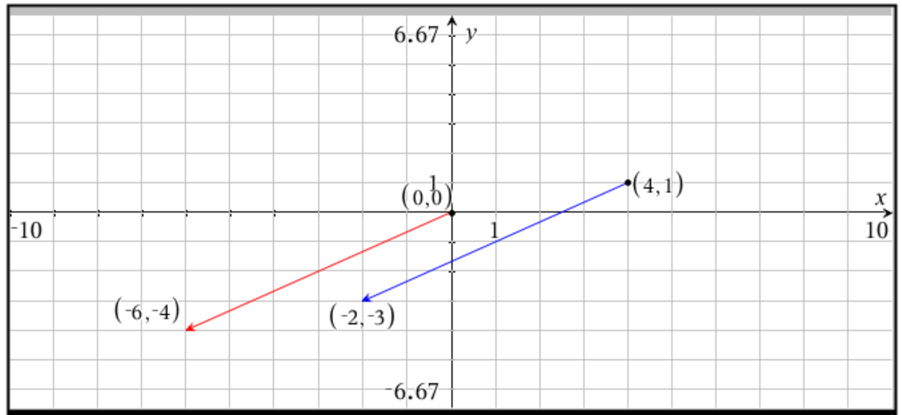
Problem 1



There are an infinite number of correct responses to Question 1 to maintain <6,2>

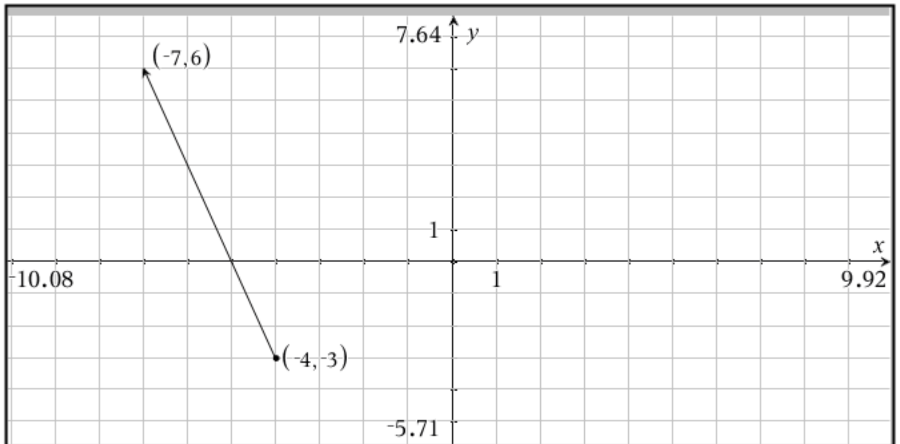
Problem 2



Blue Or original vector has direction <−6,−4> or follows −6i−4j

Red vector from (0,0) will end at (−6,−4)

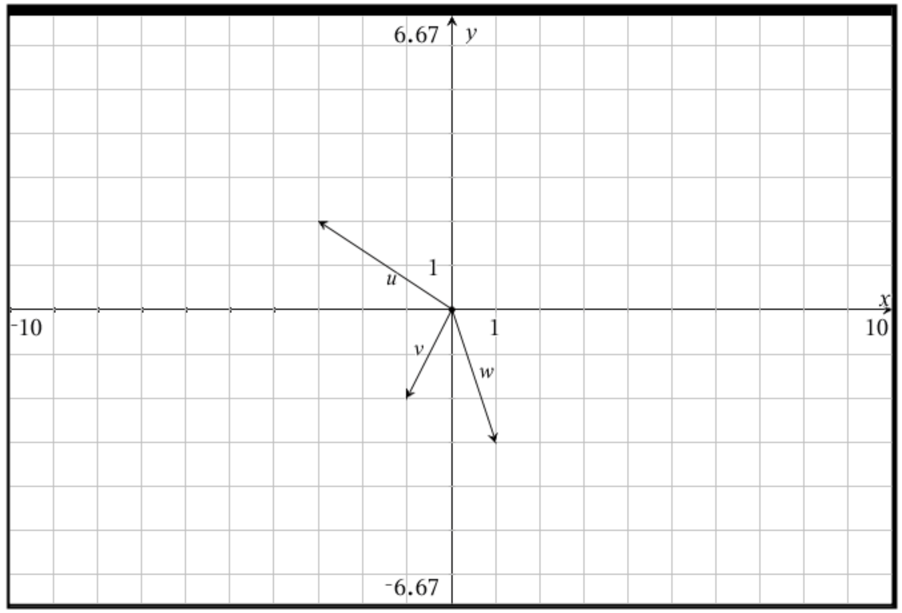
Problem 3



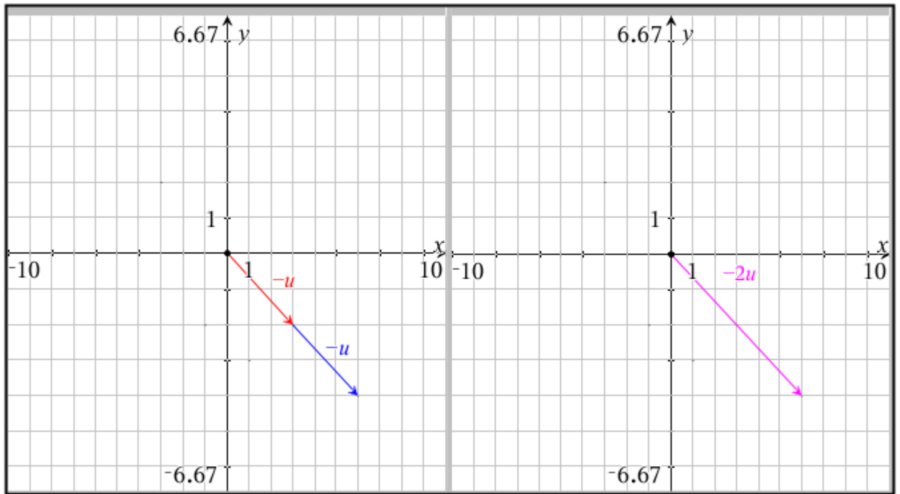
Direction of given vector <−7−−4,6−−3>= <−3, 9>

Magnitude of given vector = $\sqrt{(-3)^2+9^2} = \sqrt{9+81} = \sqrt{90} = 3\cdot\sqrt{10}$

Problem 4

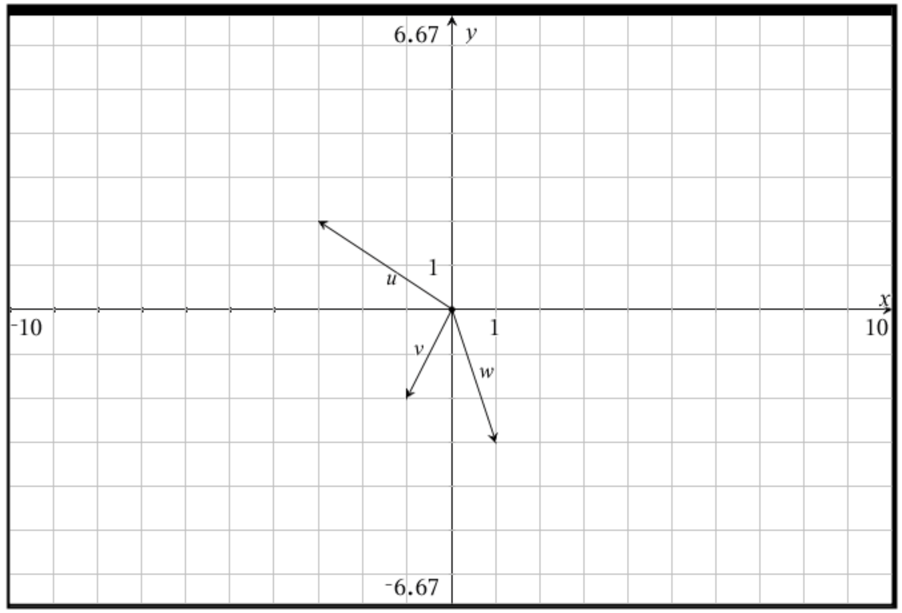


Problem 4

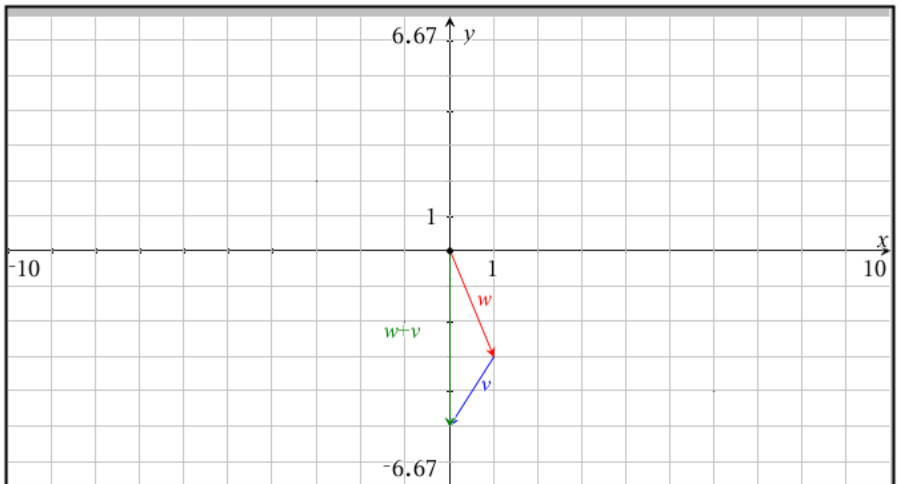


Sketch −2u

Problem 5

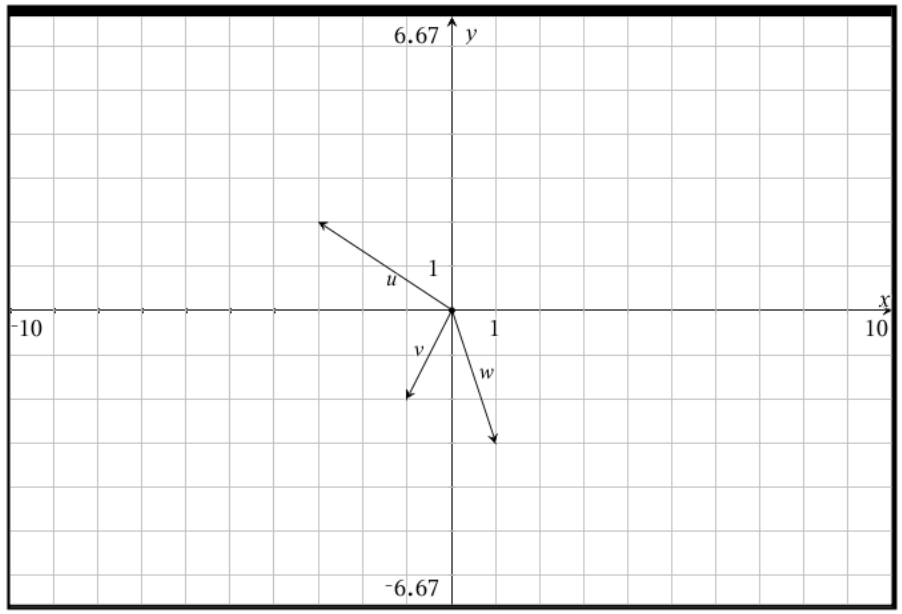


Problem 5

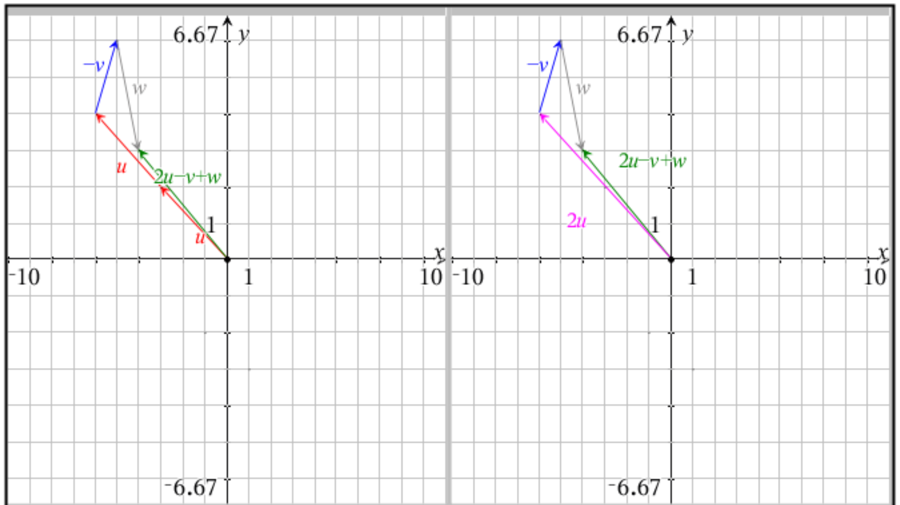


Sketch w+v

Problem 6



Problem 6



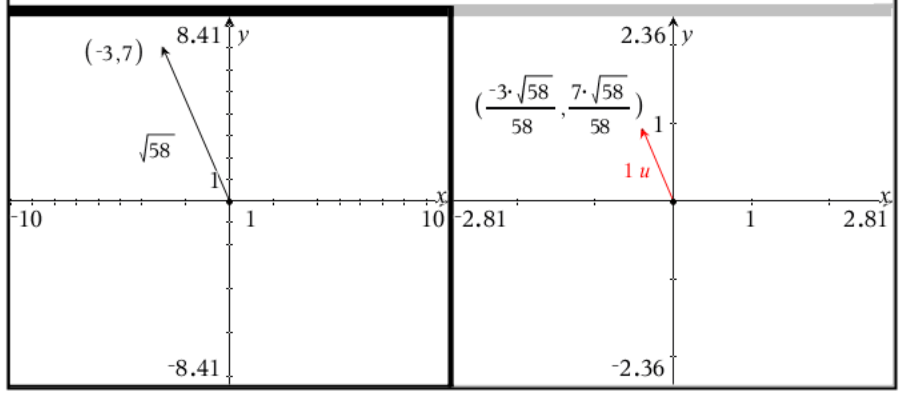
Sketch 2u−v+w

Problem 7

Unit vector of W in the same direction with w = <−3,7>

magnitude of w = $\sqrt{(-3)^2+7^2} \blacktriangleright \sqrt{58}$

Unit vector $= < \dfrac{-3}{\sqrt{58}}, \dfrac{7}{\sqrt{58}} > = < \dfrac{-3\cdot\sqrt{58}}{58}, \dfrac{7\cdot\sqrt{58}}{58} >$



Problem 8

Find a vector with the same magnitude of vector b , whose magnitude is 5 and same direction as c = 2i−9j

Magnitude of c = $\sqrt{2^2+(-9)^2} = \sqrt{85}$

Unit Vector of c = $\dfrac{2}{\sqrt{85}}i - \dfrac{9}{\sqrt{85}}j$ which is also $\dfrac{2\cdot\sqrt{85}}{85}i - \dfrac{9\cdot\sqrt{85}}{85}j$

Vector with same direction as c and length 5 is the same as 5(unit vector of c)

Unit Vector of c = $\dfrac{10}{\sqrt{85}}i - \dfrac{45}{\sqrt{85}}j$ which is also $\dfrac{2\cdot\sqrt{85}}{17}i - \dfrac{9\cdot\sqrt{85}}{17}j$

Problem 9

v =<v1,v2> w =<w1,w2>

Find any two vectors such that the dot product is 14

There are an infinite number of vectors that have a dot product of 14

v·w =(v1)(w1)+(v2)(w2)

Some that work v = <13,1> w =<1,1>

v = <3,2> w = <4,1>

v = <1,1> w = <14,0>

v = <1,7> w = <7,1>

v = <3,4> w = <2,2>

v = <2,1> w = <6,2>

v = <5,−3> w = <4,2>

v = <1,1> w = <7,7>

v = <1,1> w = <10,4>

Problem 10

u=<7,−3> v = <−11,5> w =<−6,1> z = <4,4>

v+z = <−11,5> + <4,4> =<−11+4,5+4>=<−7,9> as a linear combination −7i+9j

Problem 11

u=<7,−3> v = <−11,5> w =<−6,1> z = <4,4>

z·u·v

z·u = <4,4>·<7,−3> = 4(7)+(4)(−3) =28−12 =16

Therefore z·u·v =(z·u)·v = 16 <−11,5> =<−176,80>

Problem 12

u=<7,−3> v = <−11,5> w =<−6,1> z = <4,4>

Find angle between u and w

u· w = <7,−3>· <−6,1> = (7)(−6)+(−3)(1) =−42−3 =−45

Magnitude of u $=\sqrt{7^2+(-3)^2} = \sqrt{58}$ Magnitude of w $=\sqrt{(-6)^2+1^2} = \sqrt{37}$

$\cos\theta = \frac{-45}{\sqrt{58}\cdot\sqrt{37}} = \frac{-45\cdot\sqrt{2146}}{2146}$

$\theta = \cos^{-1}\left(\frac{-45.}{\sqrt{58}\cdot\sqrt{37}}\right) ▸ 166.263731694\ °$

z·u = <4,4>·<7,−3> = 4(7)+(4)(−3) =28−12 =16

Therefore z·u·v =(z·u)·v = 16 <−11,5> =<−176,80>

Problem 13

u=<7,−3> v = <−11,5> w =<−6,1> z = <4,4>

find || v||

v = <−11,5> has magnitude $\sqrt{(-11)^2+5^2} = \sqrt{146}$

Problem 14

u=<7,−3>   v = <−11,5>   w =<−6,1>   z = <4,4>

v·w

v·w = v = <−11,5>·<−6,1>= −11(−6)+(5)(1) =66+5 =71

Problem 15

u=<7,−3>   v = <−11,5>   w =<−6,1>   z = <4,4>

Find the directional angle of v

The directional angle is the angle from the initial position of the angle starting between Q1 and Q4

If drawn from (0,0) v is quadrant 2 point(−11, 5)

This also means that it has a tangent ratio $=\frac{5}{11}$

$\tan^{-1}\left(\frac{5}{11.}\right) = 24.4439547804$ ° which has a reference angle of $180-\tan^{-1}\left(\frac{5}{11.}\right) \approx 155.6$ °

Problem 16

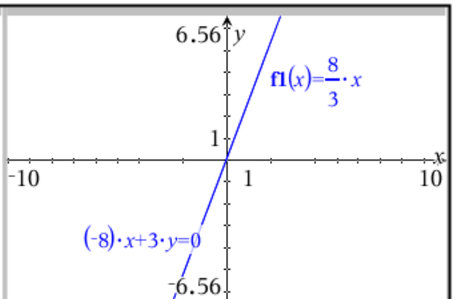
State a vector that orthogonal to d =<−8,3>

Some examples that worked

<−3,−8>

<3, 8>

$<x, \frac{3}{8}x>$



x	f1(x):= 8/3*x	
87.	232.	
88.	234.666...	
89.	237.333...	
90.	240.	

240.

There are an infinite number of vectors that are orthogonal to d

d·n=0 ,

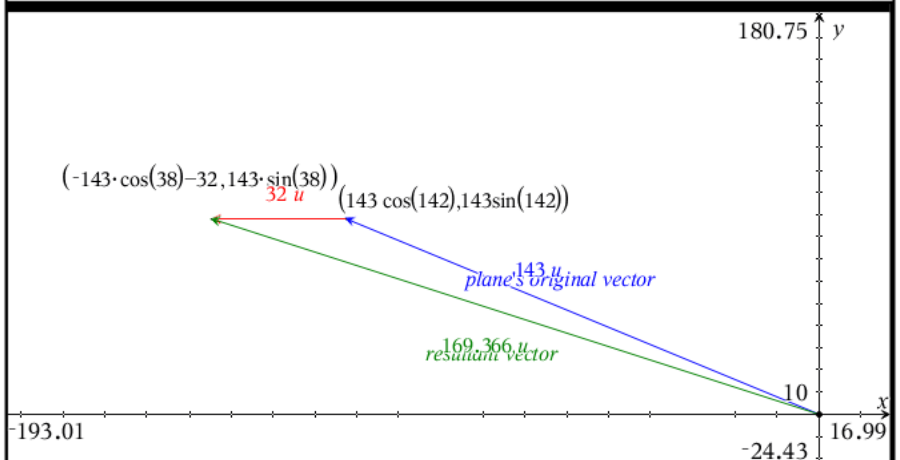
therefore <−8,3>· <n1,n2> = −8n1+3n2

So any set of points such that (n1,n2) lies on the line $y = \frac{3}{8}x$

Problem 17

A plane is traveling 38° north of west at 143 mph

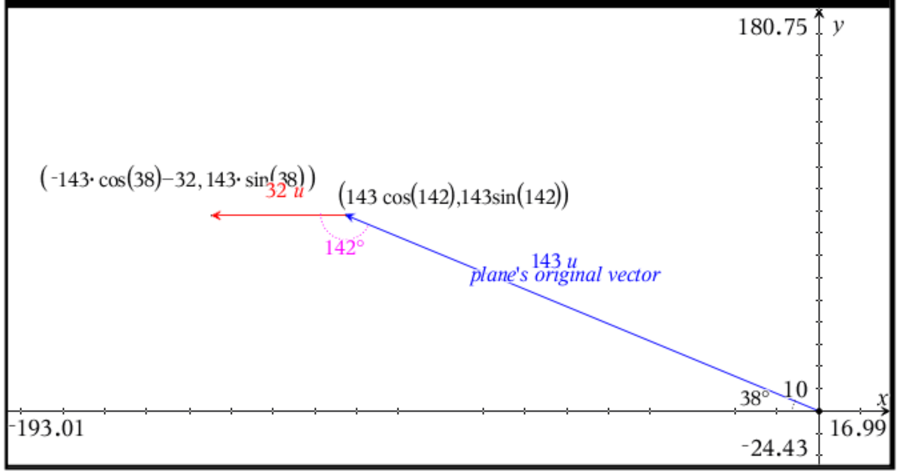
A gusty wind is blowing due west at a rate of 32 mph



Problem 17

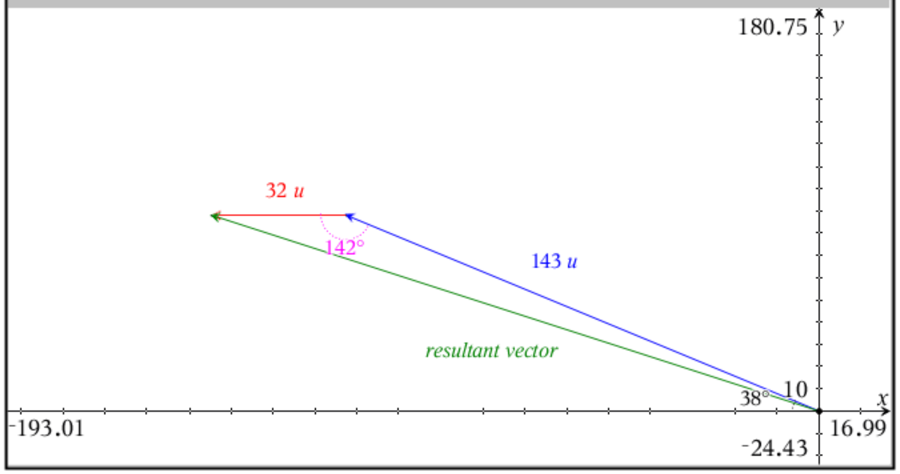
A plane is traveling 38° north of west at 143 mph

A gusty wind is blowing due west at a rate of 32 mph



Problem 17

resultant vector's magnitude = $\sqrt{32^2+143^2-2\cdot 32\cdot 143\cdot \cos(142.)}$ ▸ 169.366095831



Problem 17

resultant vector's direction

<−32+143cos(142),143sin(142)>

≈<-144.685537766 ,88.0395909716 >

$\tan^{-1}\left(\frac{143\cdot \sin(142.)}{-32+143\cdot \cos(142)}\right)$ ▸ -31.3200622146 °

resultant vector's bearing 90−31.3°≈58.7 °

N 58.7° W at a magnitude of 169.4

31.3° North of West at a magnitude of 169.4

Bearing of 301.3 ° with a magnitude of 169.4