Homework

1. Find the components of the vector having initial point P_1 and terminal point P_2

   (a) $P_1(4,8)$, $P_2(3,7)$ (b) $P_1(-1,0,2)$, $P_2(0,-1,0)$

2. Find a non-zero vector $\vec{u}$ with initial point $P(-1,3,5)$ such that

   (i) $\vec{u}$ has the same direction as $\vec{v}=(6,7,-3)$

   (ii) $\vec{u}$ is oppositely directed to $\vec{v}=(6,7,-3)$

3. Find a non-zero vector $\vec{u}$ with terminal point $Q(3,0,-5)$ such that

   (i) $\vec{u}$ has the same direction as $\vec{v}=(4,-2,-1)$

   (ii) $\vec{u}$ has the opposite direction of $\vec{v}=(4,-2,-1)$

4. Let $\vec{u}=(-3,1,2)$, $\vec{v}=(4,0,-8)$ and $\vec{w}=(6,-1,-4)$. Find the components of $(2\vec{u}-7\vec{w})-(8\vec{v}+\vec{u})$

5. Let $\vec{u},\vec{v}$ and $\vec{w}$ be the vectors in Exercise 4. Find the components of the vector $\vec{x}$ that satisfies $2\vec{u}-\vec{v}+\vec{x}=7\vec{x}+\vec{w}$

6. Find the scalars a and b such that
$$a(3,1)+b(-2,1)=(-13,-1)$$

7. Let $\vec{v}=(2,3)$ and $\vec{w}=(-7,-2,1)$
   Find $\|\vec{v}\|$ and $\|\vec{w}\|$.

8. Find the distance between P_1 and P_2

   (a) $P_1(-3,6)$, $P_2(-1,-4)$ (b) $P_1(7,-5,1)$, $P_2(-7,-2,-1)$

9. Let $\vec{v}=(-1,2,5)$. Find all scalars k such that $\|k\vec{v}\|=4$

Answers

1.(a) $\vec{P_1P_2} = (-1, -1)$ (b) $\vec{P_1P_2} = (1, -1, 2)$

2.(i) Initial Point $P(-1, 3, 5)$ and terminal point $Q(5, 10, 2)$
 (ii) // // $P(-1, 3, 5)$ // // // $Q(-7, -4, 8)$

3.(i) Initial Point $P(-1, 2, 4)$ and terminal point $Q(3, 0, -5)$
 (ii) // // $P(7, -2, -6)$ // // // $Q(3, 0, -5)$.

4. $(2\vec{u} - 7\vec{w}) - (8\vec{v} + \vec{u}) = (-77, 8, 62)$.

5. $\vec{x} = \left(\frac{-8}{3}, \frac{1}{2}, \frac{8}{3} \right)$.

6. $a = -3$, $b = 2$.

7. $\| \vec{v} \| = \sqrt{13}$ $\| \vec{w} \| = \sqrt{54} = 3\sqrt{6}$

8.(a) $D = \sqrt{104} = 2\sqrt{26}$ (b) $D = \sqrt{209}$.

9. $k = \pm \dfrac{4}{\sqrt{30}}$