$\vec{V}$ECTORS (Geometric approach) Solution

Given these points P (3,5) Q (6,8) R (-2, -3) and S (-5,1) $\vec{u} = \overrightarrow{PQ}, \vec{v} = \overrightarrow{RS}$

a) Draw $\vec{u}, \vec{v}$

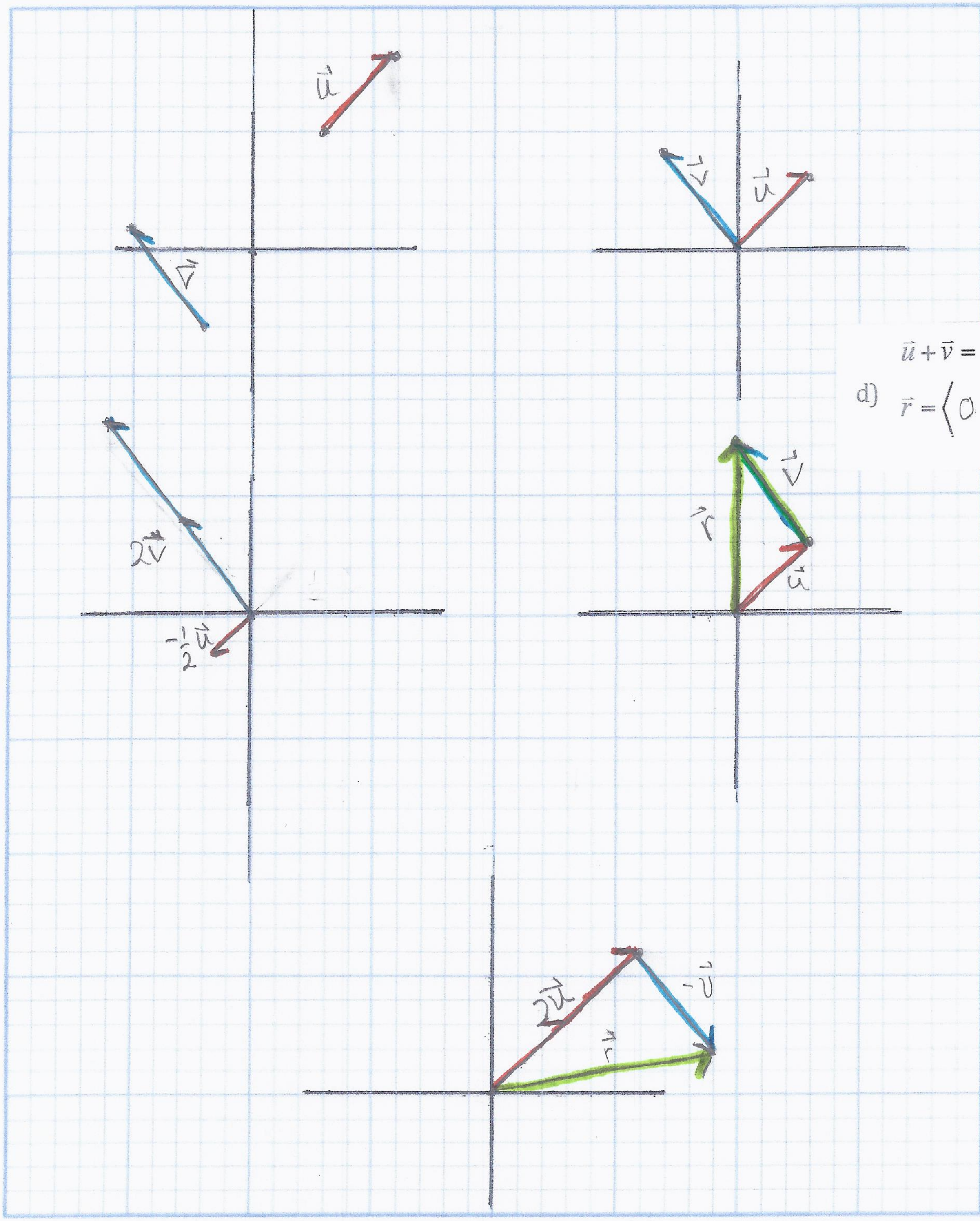
b) standard position: $\vec{u} = \langle 3, 3 \rangle, \vec{v} = \langle -3, 4 \rangle$

c) $-\frac{1}{2}\vec{u}$

$2\vec{v}$

d) $\vec{u} + \vec{v} = \vec{r}$

$\vec{r} = \langle 0, 7 \rangle$



e) $2\vec{u} - \vec{v} = \vec{r} = \langle 9, 2 \rangle$

$\overrightarrow{\text{VECTORS}}$ (Algebraic) P (3,5) Q (6,8) R (-2,-3) S (-5,1)

Solution

	Magnitude, direction $\lVert\vec{v}\rVert$ θ	Component form $\langle v_1,v_2\rangle$	Unit Vector form $a\hat{i}+b\hat{j}$	Direction angle form $\lVert\vec{v}\rVert\langle\cos\theta,\sin\theta\rangle$
$\vec{u}=\overrightarrow{PQ}=\sqrt{3^2+3^2}$	$3\sqrt{2}$ 45°	$\langle 3,3\rangle$	$3\hat{i}+3\hat{j}$	$3\sqrt{2}\langle \frac{\sqrt{2}}{2}, \frac{\sqrt{2}}{2}\rangle$
$\vec{v}=\overrightarrow{RS}=\sqrt{3^2+4^2}$	5 126.9°	$\langle -3,4\rangle$	$-3\hat{i}+4\hat{j}$	$5\langle -\frac{3}{5}, \frac{4}{5}\rangle$
$-\frac{1}{2}\vec{u}=-\frac{1}{2}\langle 3,3\rangle$	$\frac{3\sqrt{2}}{2}$ 225°	$\langle -\frac{3}{2}, \frac{-3}{2}\rangle$	$-\frac{3}{2}\hat{i}-\frac{3}{2}\hat{j}$	$\frac{3\sqrt{2}}{2}\langle -\frac{\sqrt{2}}{2}, -\frac{\sqrt{2}}{2}\rangle$
$2\vec{v}=2\langle -3,4\rangle$	10 126.9°	$\langle -6,8\rangle$	$-6\hat{i}+8\hat{j}$	$10\langle \cos 126.9^\circ, \sin 126.9^\circ\rangle$
$\vec{u}+\vec{v}=\langle 3,3\rangle+\langle -3,4\rangle$	7 90°	$\langle 0,7\rangle$	$0\hat{i}+7\hat{j}$	$7\langle \cos 90^\circ, \sin 90^\circ\rangle$ $=7\langle 0,1\rangle$
$2\vec{u}-\vec{v}=2\langle 3,3\rangle-\langle -3,4\rangle=\langle 6,6\rangle+\langle 3,-4\rangle$	$\sqrt{85}$ 12.5°	$\langle 9,2\rangle$	$9\hat{i}+2\hat{j}$	$\sqrt{85}\langle \cos 12.5^\circ, \sin 12.5^\circ\rangle$