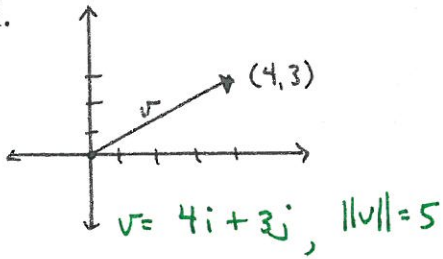
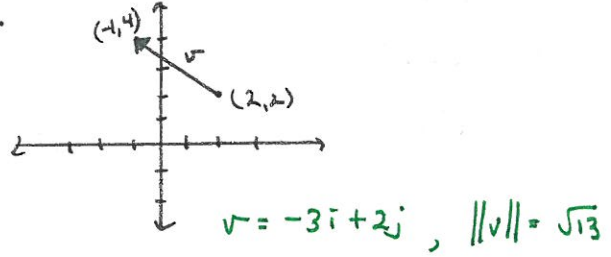


Write each vector, v , in linear form and find its magnitude.

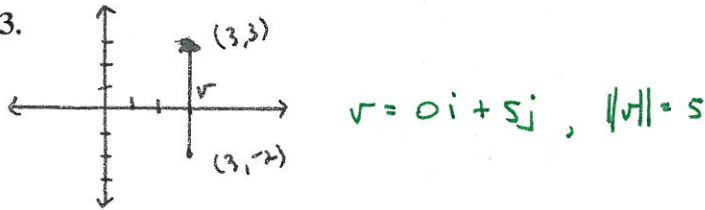
1.



2.



3.



4. Initial point: $(-1,5)$, Terminal point: $(15,12)$

$\langle 15 - (-1), 12 - 5 \rangle$

$\langle 16, 7 \rangle = 16i + 7j$

$\text{mag} = \sqrt{305} \approx 17.5$

5. Initial point: $(-3,-5)$, Terminal point: $(5,1)$

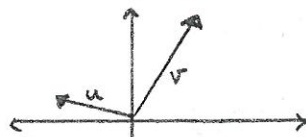
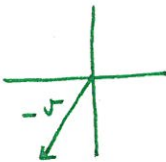
$\langle 5 - (-3), 1 - (-5) \rangle$

$\langle 8, 6 \rangle = 8i + 6j$

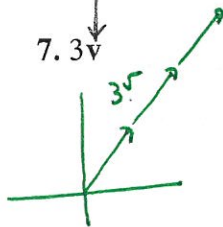
$\text{mag} = 10$

Use the figure to sketch a graph of each specified vector.

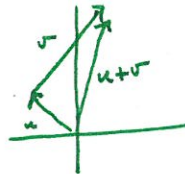
6. $-v$



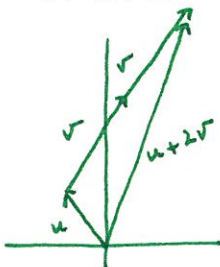
7. $3v$



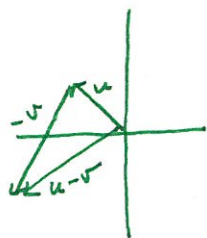
8. $u + v$



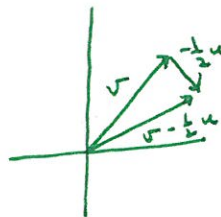
9. $u + 2v$



10. $u - v$



11. $v - .5u$



In #12-15, find a) $u + v$, b) $u - v$, and c) $2u - 3v$.

12. $u = i + 2j$, $v = 3i + j$

a) $4i + 3j$

b) $-2i + j$

c) $-7i + j$

13. $u = 4i - 2j$, $v = 0i + 0j$

a) $4i - 2j$

b) $4i - 2j$

c) $8i - 4j$

14. $u = i + j$, $v = 2i - 3j$

a) $3i - 2j$

b) $-i + 4j$

c) $-4i + 11j$

15. $u = 2i$, $v = j$

a) $2i + j$

b) $2i - j$

c) $4i - 3j$

Find the unit vector that has the same direction as vector v .

16. $v = 6i$ $\|v\| = 6$

$$\text{unit } v = \boxed{i}$$

17. $v = -5j$ $\|v\| = 5$

$$\text{unit } v = \boxed{-j}$$

18. $v = 3i - 4j$ $\|v\| = 5$

$$\text{unit } v = \frac{3i - 4j}{5} = \boxed{\frac{3}{5}i - \frac{4}{5}j}$$

19. $v = i + j$ $\|v\| = \sqrt{2}$

$$\text{unit } v = \boxed{\frac{\sqrt{2}}{2}i + \frac{\sqrt{2}}{2}j}$$

20. $v = 4i - 2j$ $\|v\| = 2\sqrt{5}$

$$\begin{aligned} \text{unit } v &= \frac{4}{2\sqrt{5}}i - \frac{2}{2\sqrt{5}}j \\ &= \boxed{\frac{2\sqrt{5}}{5}i - \frac{\sqrt{5}}{5}j} \end{aligned}$$