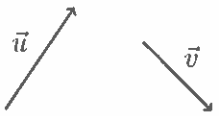
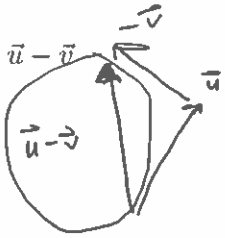
You will have at least 20 minutes to complete the quiz.

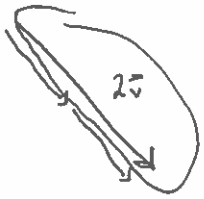
1. [2 pts each] Given the vectors $\vec{u}$ and $\vec{v}$ drawn below, sketch the following vectors. Do your best to match the original sizes.



(a) $\vec{u} - \vec{v}$



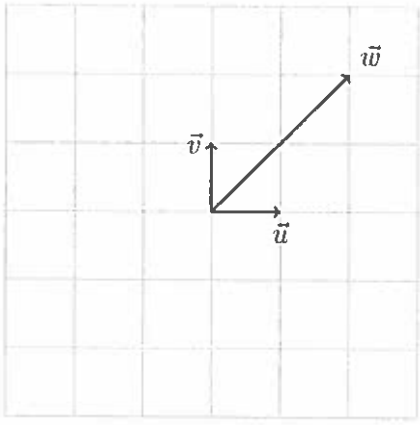
(b) $2\vec{v}$



(c) $-\vec{u} - \vec{v}$

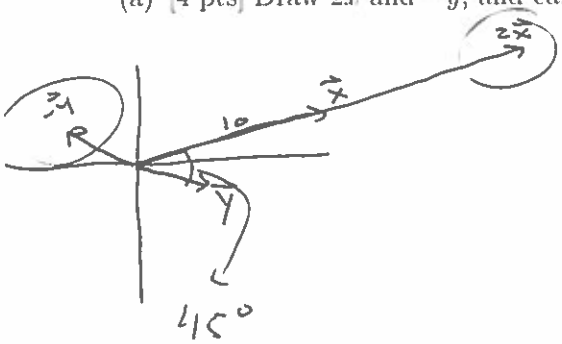
2. [4 pts] Let $\vec{u}$ and $\vec{v}$ be as shown below. Express $\vec{w}$ in terms of $\vec{u}$ and $\vec{v}$.

$\vec{w} = 2\vec{u} + 2\vec{v}$



3. Suppose $\vec{x}$ has magnitude of 10 and points 25° above the positive-x-axis, and $\vec{y}$ has a magnitude of 3 and points 20° below the positive-x-axis.

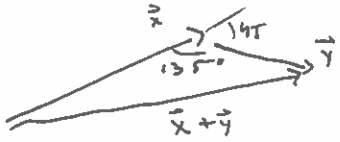
(a) [4 pts] Draw $2\vec{x}$ and $-\vec{y}$, and calculate $||2\vec{x}||$ and $||-\vec{y}||$.



$||2\vec{x}|| = 20$

$||-\vec{y}|| = 3$

(b) [3 pts] Draw $\vec{x}+\vec{y}$ and calculate $||\vec{x}+\vec{y}||$.

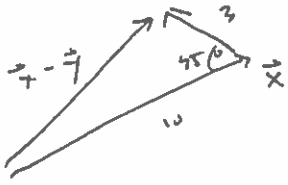


$||\vec{x}+\vec{y}||^2 = 10^2 + 3^2 - 2(10)(3)\cdot\cos(135^\circ)$

$= 151.4$

$\Rightarrow ||\vec{x}+\vec{y}|| = 12.3$

(c) [3 pts] Draw $\vec{x}-\vec{y}$ and calculate $||\vec{x}-\vec{y}||$.



$||\vec{x}-\vec{y}||^2 = 10^2 + 3^2 - 2\cdot 3\cdot 10\cdot\cos(45^\circ)$

$= 66.57$

$||\vec{x}-\vec{y}|| = 8.159$