CONTROL 9-10-2018

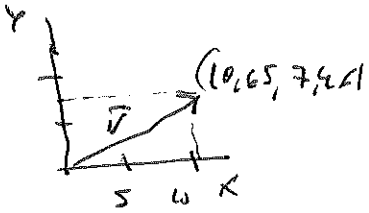
1: $\vec{u} = -6i + 3{,}3j$

$\vec{v} = 13\ 35°$

a) $|\vec{u}| = \sqrt{(-6)^2 + (3{,}3)^2} = \boxed{6{,}85}$

b) $v_x = 13 \cdot \cos 35 = 10{,}65$

$v_y = 13 \cdot \sin 35 = 7{,}46$



c) $-\vec{u} + 3\vec{v} = -(-6i + 3{,}3j) + 3(10{,}65i + 7{,}46j) =$

$= 6i + 31{,}95i - 3{,}3j + 22{,}38j = \boxed{37{,}95i + 19{,}08j}$

2) $\vec{r}_1 = -4i + 2j\ (m)$

$\vec{v}_m = 3i - 4j\ (m/s)$

a) $\vec{v}_m = \frac{\Delta \vec{r}}{\Delta t} = \frac{\vec{r}_2 - \vec{r}_1}{\Delta t} \Rightarrow \vec{r}_2 = \vec{v}_m \cdot \Delta t + \vec{r}_1$

$\vec{r}_2 = 20\,s\,(3i - 4j)\,m/s + (-4i + 2j)\,m$

$= (60i - 80j)\,m + (-4i + 2j)\,m =$

$= \boxed{(56i - 78j)\,m}$

b) $\Delta r = \vec{r}_2 - \vec{r}_1 = 20\,s \cdot (3i - 4j)\,m/s \cdot (60i - 80j)\,m$

c) $|\Delta \vec{r}| = \sqrt{(60)^2 + (-80)^2}\,m = \boxed{100\,m}$

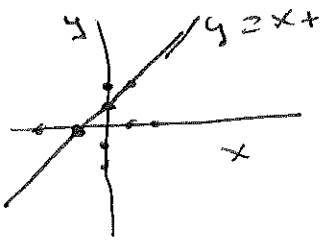
3) $x = -4t + 2\ (m)$

$y = 3 - 4t\ (m)$

$-4t = x - 2$

$y = 3 + (x - 2) = \boxed{x + 1}$

x =	y
1	2
0	1
−1	0



4/ $\vec{r}(t) = (6 + 4t^2)\,i + (3 + 3t^2)\,j$ (m)

a) $\vec{r}(1) = (6+4)\,i + (3+3)\,j$ (m) $= \boxed{10i + 6j\ (m)}$

$\vec{r}(3) = (6 + 4\cdot 3^2)\,i + (3 + 3\cdot 3^2)\,j$ (m)

$= \boxed{42i + 30j\ (m)}$

$\vec{\Delta r} = \vec{r}(3) - \vec{r}(1)$

$= (42i + 30j)\,m - (10i + 6j)\,m$

$= \boxed{32i + 24j\ (m)}$

b) $\vec{v}_t = \dfrac{d(\vec{r}(t))}{dt} = \dfrac{d\left((6 + 4t^2)\,i + (3 + 3t^2)\,j\right)}{dt}$ m/s

$= 8ti + 6tj\ (m/s)$

c) $|\vec{v}| = \sqrt{(8t)^2 + (6t)^2}$ m/s $= \sqrt{64t^2 + 36t^2}$ m/s $= \sqrt{100t^2}$ m/s $= 10t$ m/s

$|\vec{v}(2s)| = 10 \cdot 2$ m/s $= 20$ m/s

d) $\vec{a} = \dfrac{d(\vec{v})}{dt} = \dfrac{d(8ti + 6tj)}{dt} = \boxed{8i + 6j\ (m/s^2)}$