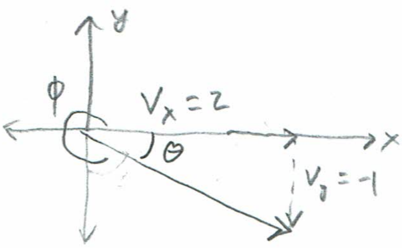
a) The approach is to take the derivative to find $\vec{v}$!

$$\vec{v}(t) = (2At - B)\hat{i} - C\hat{j}$$

b) At $t = 3s$ $\quad \vec{v}(3s) = \left(2\cdot 0.5\frac{m}{s^2}\cdot 3s - 1m/s\right)\hat{i} - 1\frac{m}{s}\hat{j}$

$$\vec{v}(3s) = 2\frac{m}{s}\hat{i} - 1\frac{m}{s}\hat{j}$$



The magnitude is

$$v = \sqrt{\left(2\frac{m}{s}\right)^2 + \left(1\frac{m}{s}\right)^2} = \sqrt{5}\,\frac{m}{s} = 2{,}34\,m/s$$

To find the direction note that $\tan\theta = \frac{1}{2}$

so $\cancel{\tan}\ \theta = \tan^{-1}\left(\frac{1}{2}\right) = 26{,}57°$

which means $\phi = 360 - 26.57° = 333{,}43°$

so $\vec{v}(3s) = 2{,}34\frac{m}{s}$ 333.43° ccw of the x-axis

c) $V_{av,1-3s} = \dfrac{\vec{r}(3s) - \vec{r}(1s)}{3s - 1s}$

$$\vec{r}(1s) = \left(0.5\frac{m}{s^2}(1s)^2 - 1\frac{m}{s}(1s)\right)\hat{i} - 1\frac{m}{s}\cdot 1s\,\hat{j}$$

$$= -0{,}5\,m\,\hat{i} - 1\,m\,\hat{j}$$

$$\vec{r}(3s) = \left(0.5\frac{m}{s^2}(3s)^2 - 1\frac{m}{s}(3s)\right)\hat{i} - 1m/s\cdot 3s\,\hat{j}$$

$$= 1{,}5\,m\,\hat{i} - 3m\,\hat{j}$$

$$= \frac{(1{,}5m - -0{,}5m)\hat{i} + (-3m - -1m)\hat{j}}{2s}$$

$$= \frac{(2m)\hat{i} - 2m\hat{j}}{2s}$$

$$= 1\frac{m}{s}\hat{i} - 1\frac{m}{s}\hat{j}$$