1-10) $\vec{r} = 2b\sin\omega t\,\hat{i} + b\cos\omega t\,\hat{j}$

(a) $\vec{v} = \dot{\vec{r}} = b\omega(2\cos\omega t\,\hat{i} - \sin\omega t\,\hat{j})$

$\vec{a} = \dot{\vec{v}} = -b\omega^2(2\sin\omega t\,\hat{i} + \cos\omega t\,\hat{j})$

Speed $= |\vec{v}| = b\omega\sqrt{4\cos^2\omega t + \sin^2\omega t}$

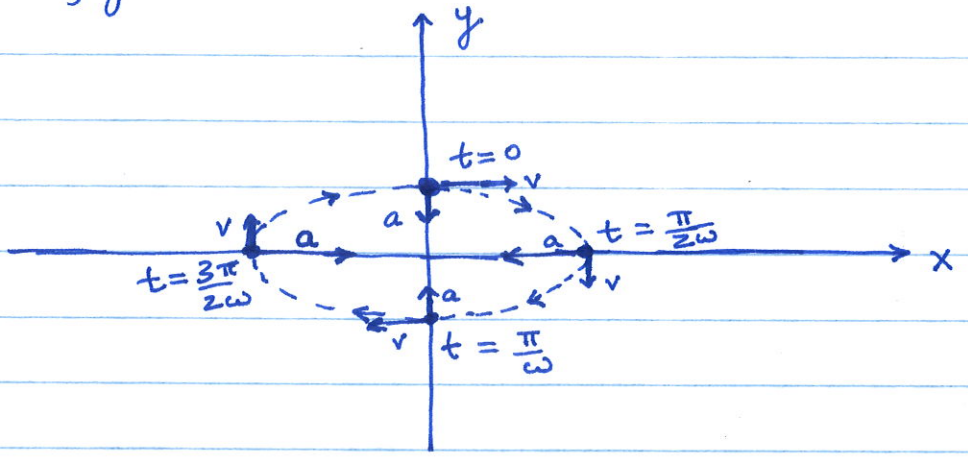
(b) $\cos(\vec{v},\vec{a}) = \dfrac{\vec{v}\cdot\vec{a}}{|\vec{v}||\vec{a}|} = \dfrac{4\cos\omega t\sin\omega t - \sin\omega t\cos\omega t}{va}$

$= \dfrac{3\cos\omega t\sin\omega t}{va}$. At $t = \dfrac{\pi}{2\omega}$ the cosine is zero. ($\cos\omega t\big|_{t=\frac{\pi}{2\omega}} = 0$).

Thus $\cos(\vec{v},\vec{a}) = 0$ and

the angle we seek is $\dfrac{\pi}{2}$.

[It could be $\dfrac{3\pi}{2}$, but if this motion is drawn on a figure it becomes more clear:



]