Ex 5

torsdag 22. september 2016 15.18

$$v = \frac{dr}{dt}, \text{ using } \frac{1}{dt} = \frac{1}{B(1-\cos\theta)} \frac{1}{d\theta}$$

$$= \frac{1}{B(1-\cos\theta)} \frac{d}{d\theta}\left(A(1-\cos\theta)\right)$$

$$= \frac{A}{B} \frac{\sin\theta}{(1-\cos\theta)}$$

~~$2/3 - 1 = 1/3$~~

$$= \frac{A}{\sqrt{\frac{A^3}{GM}}} \frac{\sin\theta}{(1-\cos\theta)} = \sqrt{\frac{GM}{A}} \frac{\sin\theta}{(1-\cos\theta)}$$

$$= \sqrt{\frac{GM}{A} \frac{\sin^2\theta}{(1-\cos\theta)^2}}$$

$(1-\cos\theta)^2 = 1 + \cos^2\theta - 2\cos\theta$

$$= \sqrt{\frac{GM}{r} \frac{\sin^2\theta}{(1-\cos\theta)}} = \sqrt{\frac{2GM}{r}} \cos\frac{\theta}{2}$$

$$v\left(\theta = \frac{3\pi}{2}\right) = \sqrt{\frac{2GM}{r}} \cos\frac{3\pi}{4} = -\frac{1}{\sqrt{2}}\sqrt{\frac{2GM}{r}}$$

$$\boxed{v_{vir} = \sqrt{\frac{GM}{r}}}$$

$$\left(\frac{m^3 \cancel{kg^{-1}} s^{-2} \cdot \cancel{kg}}{m}\right)^{-1/2} = \left(m^2 s^{-2}\right)^{-1/2}$$

$$= m s^{-1}$$