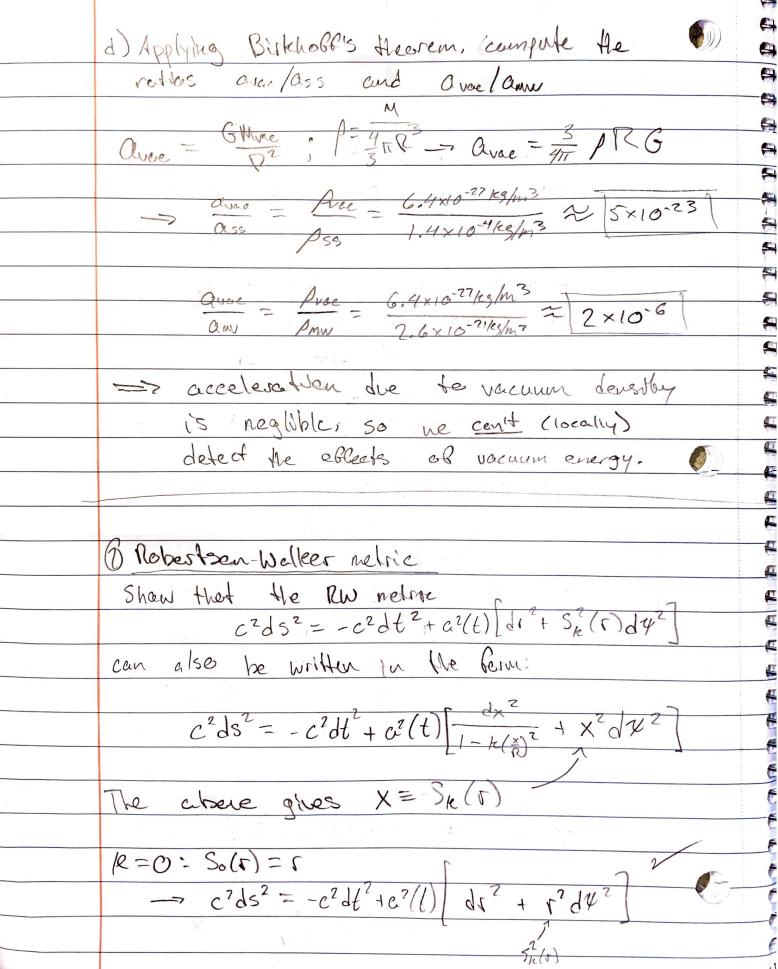
## Phys 432 HWI

Trever McCaffsey Jon 13, 2022

Decal Ellectes of Cosmologocal Constant? a) Compute the equivalent mass density of the cosmological constant in SI units! P = 3Ho Place = 3 (70 km/s/mpc) (0.7)
876 (6.67 × 10-11 m3)
40.21 b) for the seles system, assume the Sun deminates the mass and use IAU as He cherebevishre radius. Compute He ay. density. Approximate SS OS splesse: c) For the Galaxy, assume that the mass is 10"Mo without the Sun's earbit of 8.5 kpc



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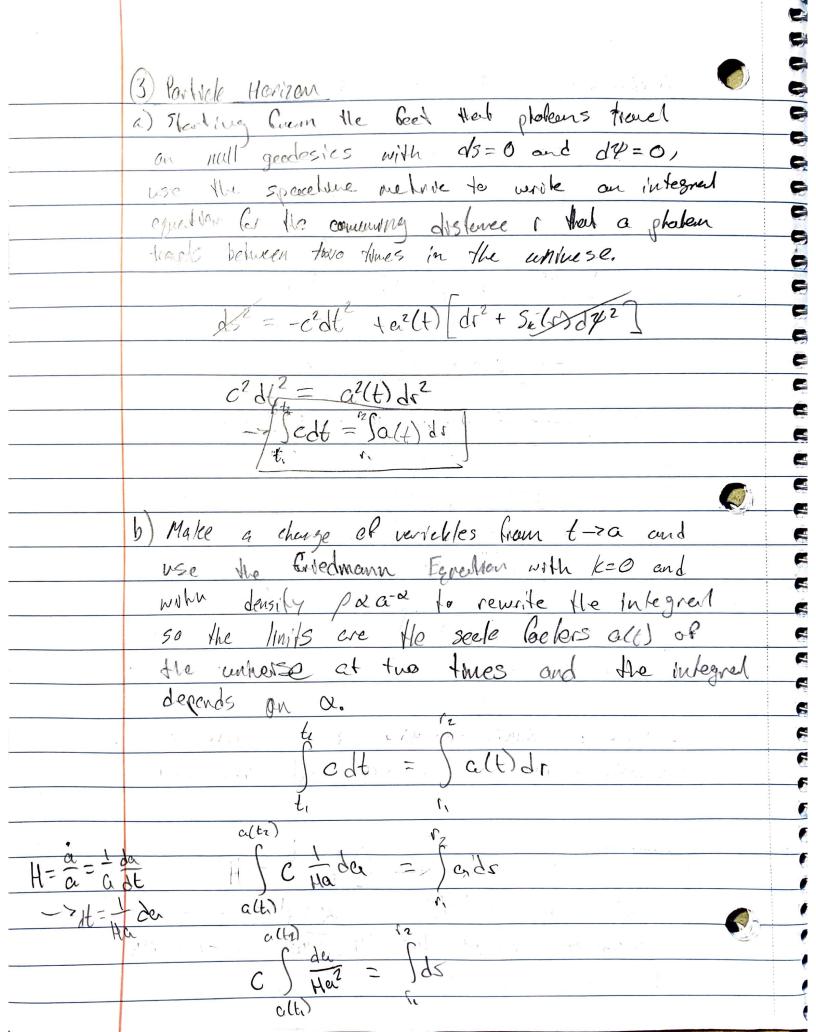
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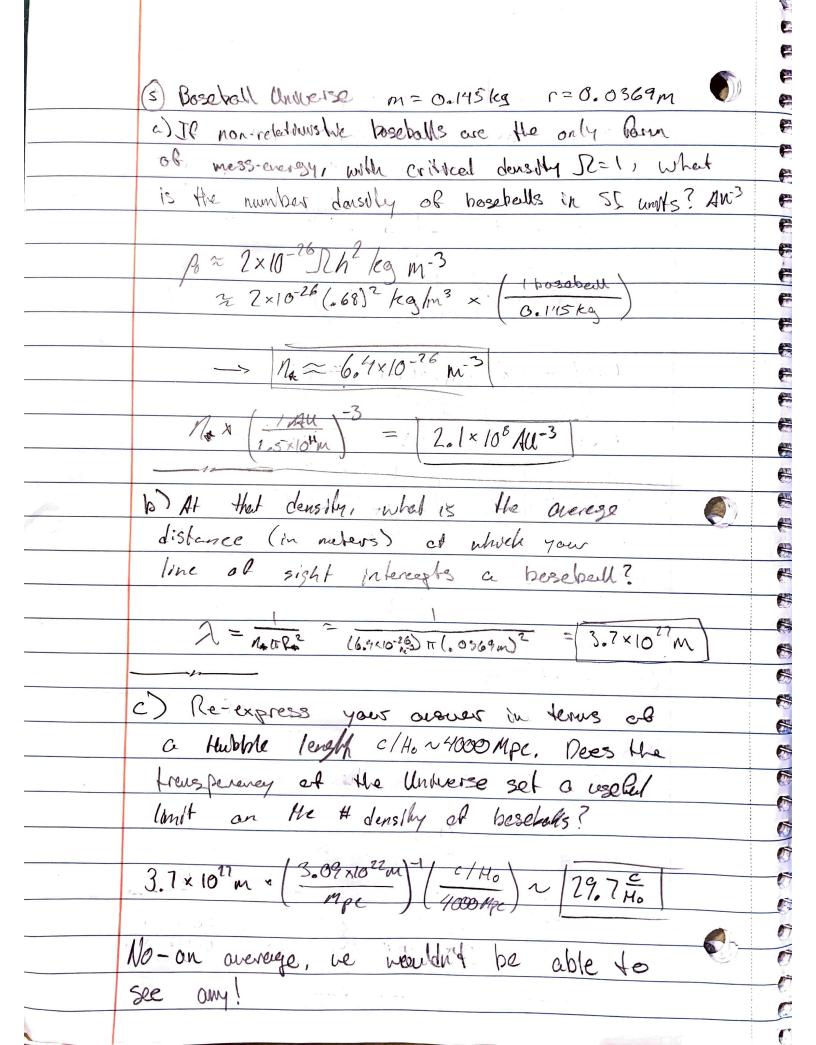
K=-1: S-(1) = Rsinh(1/12)  $dc^2 = \frac{dx}{1+(x)^2}$  $\frac{dx}{\sqrt{1+x^2/\rho^2}} = \frac{dx}{\sqrt{R^2+x^2}}$ -> (= RSINK (X) = RSINK (RSINK (1/02)) - r = R (%)  $\Gamma = \Gamma / 2 \Rightarrow d\Gamma^2 = \frac{dx^2}{1 + \left(\frac{x}{b}\right)^2}$  $c^{2}ds^{2} = -c^{2}dt^{2} + \alpha^{2}(t) \left[ \frac{dx^{2}}{1 + x^{2}/2} + x^{2}dz^{2} \right]$ k=1: S, (1) = RSUN(1/12) dr2 = dx2 -> Ids - R J 102-2 = R sin-1 (x/R)

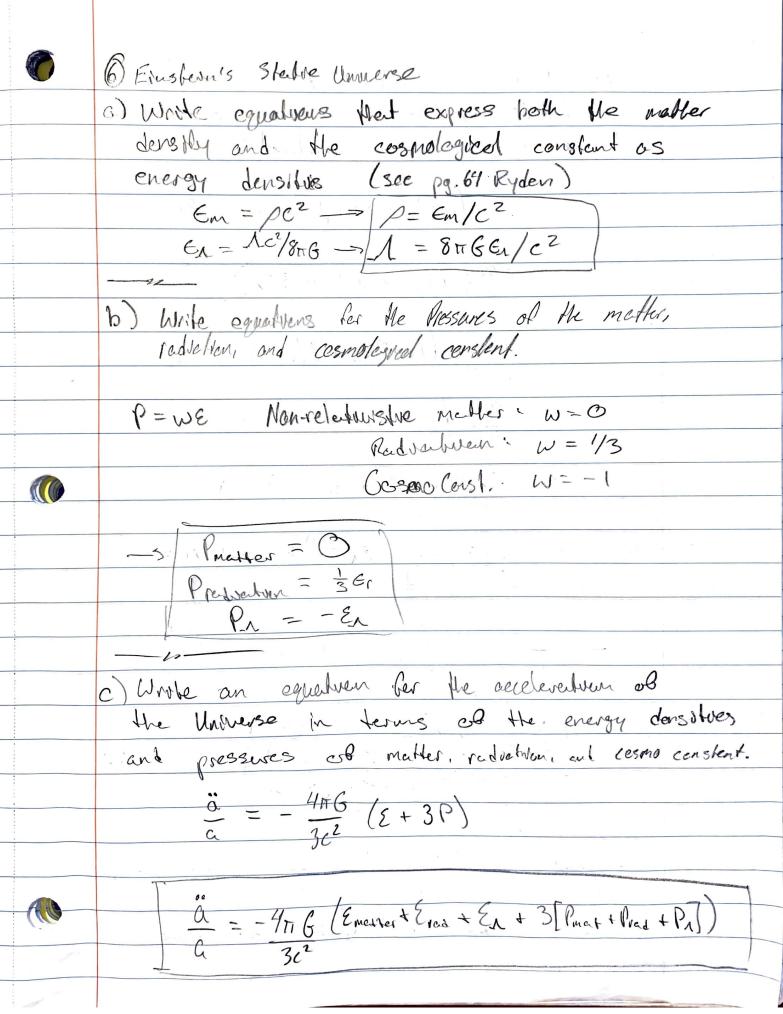
(= Rsin-1 (Rsin(x/R)) -> 1=R(1/8) 1=1 = 1-1×10)2 V  $c^{2}ds^{2} = -c^{2}dt^{2} + a^{2}(t) \frac{dx^{2}}{1 - x^{2}/0^{2}} + x^{2}dy^{2}$ => NW: c2/52=-c2/t2 + c2(t) = + x2/12 for 1=0,±1



Friedmann: H2 - 81769 = 12 -- H = 8x3P == c | 0 18 16 de = ) ds = 12 de = 12 ds PLaa  $\frac{c}{2\sqrt{2\pi60}} \frac{3}{\sqrt{2a^2a^2/2}} da = ds$  $= \frac{3}{2} \int \frac{dq}{2\pi 6 f_0} \int \frac{dq}{q^2 - \kappa/2} = \Delta f$ c) Integral converges if 2-42>1-> 2>2 Is this condition satisfied in a universe that 4 contents matter, rediction, and dosle energy? **(** Prad & at, 452 /; Pmastes & at, 3>2 /; Acada, 0>2 X **(1)** > Condition only satisfied in united that contains radiation and matter. Hence it holds in the early radiation danverted United S.

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