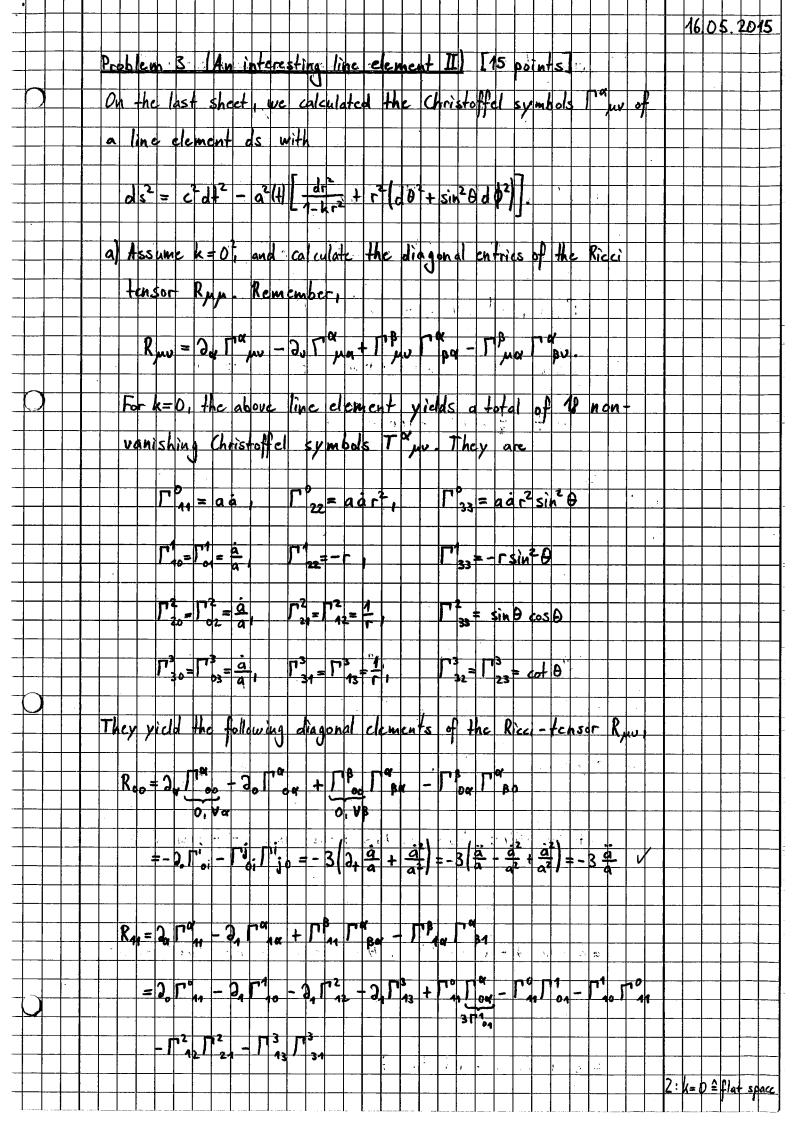
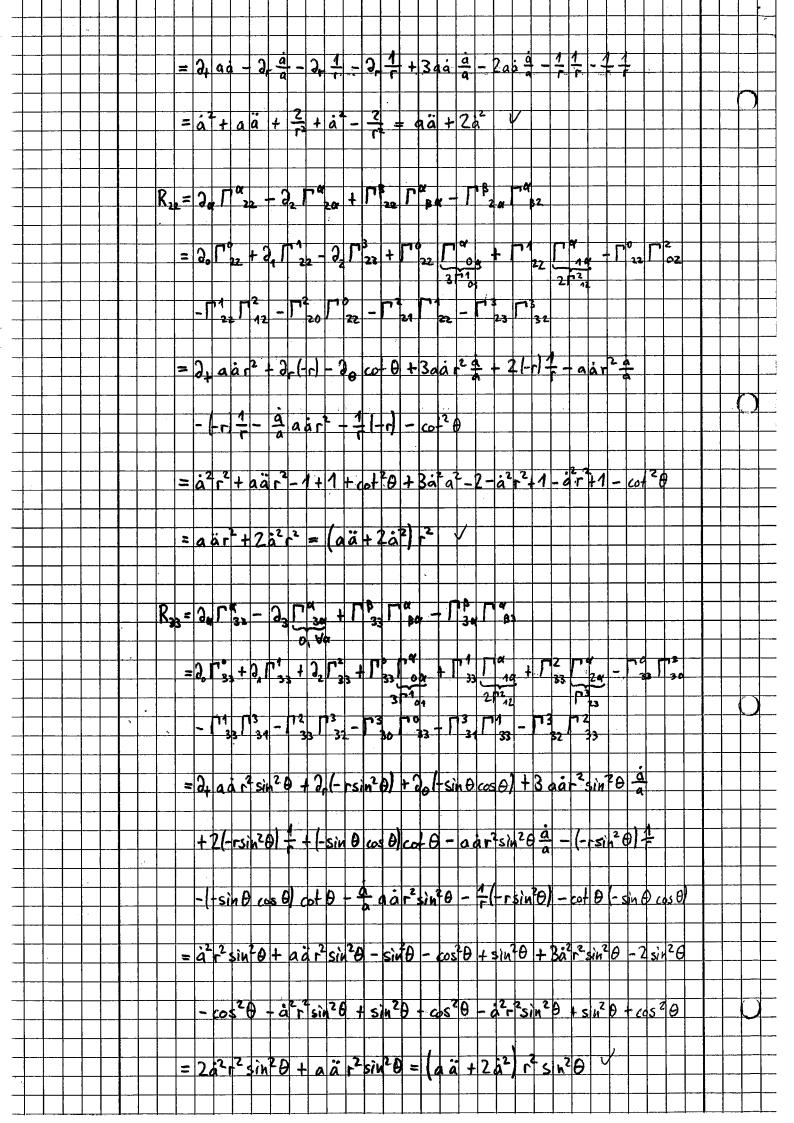
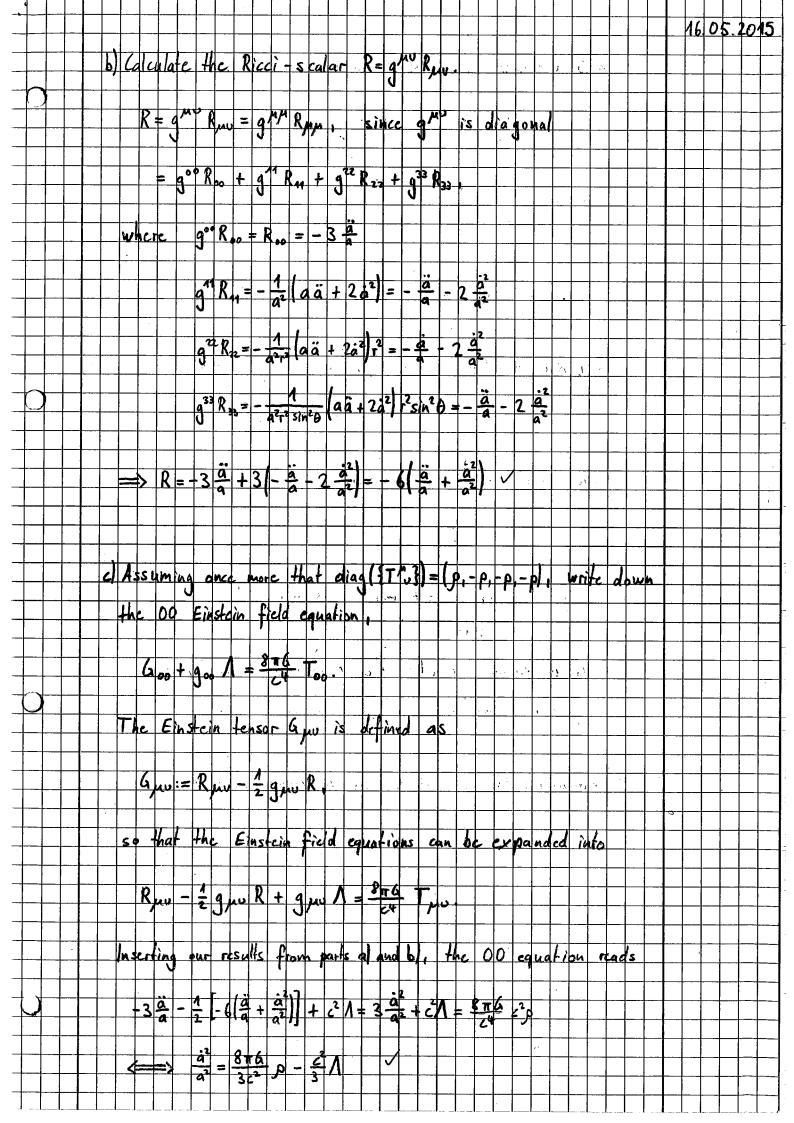


We arrive at Tu by contracting one index with the metric, i.e. The good The From this, the energy density p and the pressure p of our scalar field to can simply be read off. p = To = gon Tod = goo Tob, since the metric is diagonal = 2 (2 0 2 b - g 1) = 2 (2+ 6) 2 - 1 g 1 2 n 6 2 0 + V(6) = = = (2+0)2-12 2m + V(0) = = = 2 (2+0)2-12 2m 2 0 + V(0) = 2 (2, 0) - 1 good of + V(0) 1 since 3 0 = 0 $= \tilde{c}^{2}(2,0)^{2} + \frac{1}{2}\tilde{c}^{2}(2,0)^{2} + V(0) = \frac{\tilde{c}^{2}}{2}\tilde{d}^{2} + V(0)$ P = - T1 = - T2 = - T3 = - gra T1 = - gra T17 , again using the diagonal metric $= -(-2^{2}(1))(210)(0 - 9^{1}(1)) = 1 = \frac{1}{2}9^{1}(2,0)(0)$ $-114^{2}(1)$ = 1 gn 2 0 0 0 - V(0) = 1 go 200 200 - V(0) since 2 p=0 $=\frac{1}{2}(1+0)^{2}-V(0)=\frac{1}{2}(1-V(0))$ The diagonal form of Tru is known as Weyl's postulate which assumes a cosmos adequately described by a hydrodynamical model of an ideal fluid. In this model the cosmo logical principle, i.c. the notion that matter distribution in the Universe is isotropic and homogeneous on sufficiently large scales, justifies the diagonal form of The, which us a result, locks shear forces from the pressure component p'in j-direction (Ti, iti) energy flow per unit area in it direction (Ti), and momentum densities in i-direction (T)







Problem 4 (Extraquestion: Spatial curvature of the universe 5 points) How would you go about actioning an experiment that tests the flatness of the Universe as a whole ? Can you distinguish between a flat and a non-flat cosmos? Knowing the shape of the universe requires the consideration of two aspests: 1 its local geometry, which concerns the curvature of the observable Universe, and 2 its global geometry, i.e. the topology of the Universe as a whole. To answer the second question: any if the abscrubble Universe encompasses the enfire Universe might we be able to determine its global structure by observation. for a test resolving the question of the Universe's flatness, Charles Alcock realized decades ago that with astronomy's common method of obtaining distant object & separation from is by measuring the reashift of light reaching us from these objects it would be possible to infer the universes geometry by observing any known-to-be spherical distribution of objects. By analyzing any apparent distortion of that sphere and adapting the parameters that convert redshift to position so that the thus corrected distribution again becomes spherical, it would be possible to determine the geometry governing our Universe