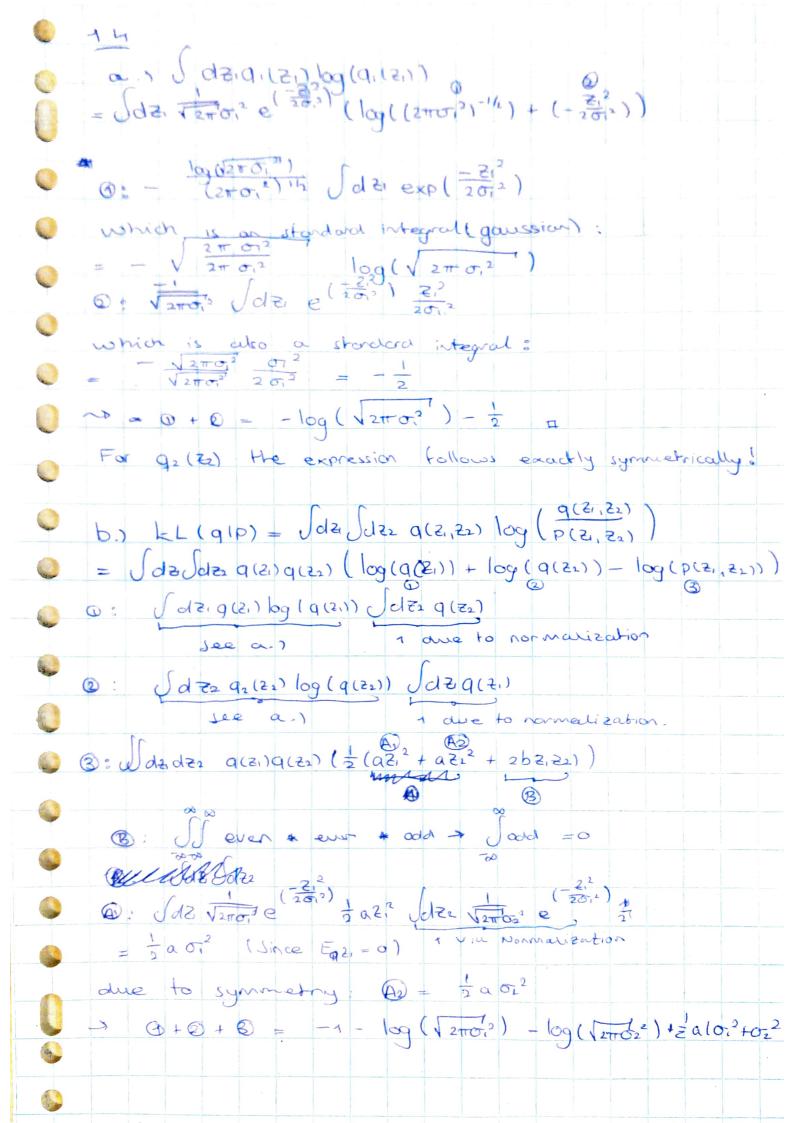


b.) The constraints are the "normal" constraints of the parameters namely that they are equal to the men definition of the mean and He unionce. For the multivariate case this then becomes: $\mathbb{E}(\vec{x}) = \vec{n} \quad \text{and} \quad \mathbb{E}(\vec{x} - \vec{x})(\vec{x} - \vec{y}) = \vec{z}$



c) 200 (KL(910)) =0 = 2 a de - V2mgi 2 Vat' 1 12m $=\frac{1}{2}aM - \frac{1}{2}a$ > 5p2 = a - op2 = a d.) we notice 2 things: 1) a: (2:) is the voriational solution, and both 9, (2) and p tollow gaussian structure a (2i) = p: (2t) where which is a gamssion!) 2.1 des P(21,22) = P2(22) since we integrate out Grage Zi or project onto za so to scery. => Epz2 = Udzidz2 P(z, Z2) Z12 Via 2.7 Jdz, P. (Z.) Z. 2 20029 via 1.7 = $\int dz_1 q_1(z_1) z_1^2 = \int_0^2 \int$ e.) Epz. = Wdzdzz p (z, z2) Z,2 complete the square with exp of p(2, 22): $az^{2} + az^{2} + 2bz_{1}z_{2} = az_{1}^{2} + \frac{b^{2}}{a}z^{2} - \frac{b^{2}}{a}z_{1}^{2} + az_{2}^{2} + 2bz_{1}z_{2}$ = Z12 (a - \frac{b^2}{a}) + (\frac{b}{4} \in 1 + \sqrt{a} \in 2) = Epzi Allowas = Johz Zi exp (-1 82 (a-b2)) Johz exp (1 2 8, Na 2) 2) no contribution to = The lest our term is the variance of a garssian with mean zero. The form of the exponent then gives $\Rightarrow = (a - \frac{b^2}{a}) =$ $\frac{a^2-b^2}{a} = \frac{a^2-b^2}{a}$ 口