Froblem Set #1. 4 (a) $n \in \mathbb{R}$, T(y) = yp(yin) = b(y) exp(ny - a(n)) Derive an expression for the mean of the distribution. Show that E[YIXiB] can be represented as the gradient of the log-partition function a with respect to the natural parameter 1 an Spyin)dy = = = { b(y) exp(ny-a(n))}dy Jp(yin)dy=1 = Son p(gin) dy = \int b(y) exp(ny-a(n)) \ \{y-=\text{3}na(n)\}\ dy = Sp(yin)· (y-3na(n))dy = \((y-3/n a(n)) p(yin) dy

= Jyp(yin)dy - Jana(n)p(yin)dy
= E[Yin] - ana(n) x Jp(yin)dy
= E[Yin] - ana(n)
= 0

ELYIN] = ELYIX 18] = 30(1)