1.

a) $\sum_d \sum_n o_{dn}(x_{dn} - u_d^T v_n)^2 + \lambda_u \sum_d u_d^T u_d + \lambda_v + \lambda_u \sum_d u_d^T u_d + \lambda_v \sum_n v_n^T v_n$

$= \sum_d \sum_n (o_{dn} x_{dn}^2 - o_{dn} 2 x_{dn} u_d^T v_n + o_{dn}(u_d^T v_n)^2) + \lambda_u \sum_d u_d^T u_d + \lambda_v \sum_n v_n^T v_n$

$= O \circ (X - U^T V)^2 + \lambda_u U^T U + \lambda_v V^T V$

$\frac{dU}{d} = O \circ (-2V(X - VU^T)) + \lambda_u (U + U^T)$

$= (JO) \circ (-2V(X - VU^T)) + O \circ (2V^2) + \lambda_u (U + U^T)$

$= \frac{(\Theta O) \circ (-2V(X - VU^T))}{\lambda_u} + \frac{O \circ (2V^2)}{\lambda_u} + U + U^T$

$= \frac{O \circ (2V^2)}{\lambda_u} + U + U^T$

$\frac{dV}{dt} = O \circ (-2U^T(X - VU^T)) + \lambda_v (V + V^T)$

$= O \circ (2U^{2T}) + \lambda_v (V + V^T)$

$= \frac{O \circ (2U^{2T})}{\lambda_v} + V + V^T$

V^2 and U^2 are not defined so something must be very wrong...