I.2 Q2

Yes. Let $M = ab^T$. M is a m by p matrix. $M_{ij} = a_i b_j$

aa^T is a symmetric, rank 1 matrix.

I.2 Q6

$a_1 b_1^* = [a_1 \ 0 \ 0]$ $a_2 b_2^* = [0 \ a_2 \ 0]$ $a_3 b_3^* = [0 \ 0 \ a_3]$

$AI = a_1 b_1^* + a_2 b_2^* + a_3 b_3^* = [a_1 \ a_2 \ a_3] = A$