

Question #5

a) True!

As projection onto column space is the one in the whole space, and contains b , when we want to solve $Ax=b$.

b) False:

No. The only invertible projection matrix in I .

c) True:

Projection matrix P is idempotent, i.e. $P^2 = P$

$$\text{Now, } (I-P)^2 = (I-P)(I-P) = II - IP - PI + P:P$$

$$= I^2 - P - P - P^2$$

$$= I - 2P + P = (I-P) \quad \because (I-P) \text{ is idempotent}$$

d) false:

onto row space is identical with onto column space of its transpose.

e) True.

The rank of AA^t is always equal to the rank of A^t .

Rowspace of A^t is always equal to the rowspace of A .