2.

(a)

$$A^T = (zz^T)^T = zz^T = A$$

$$x^T A x = x^T z z^T x = x^T z (x^T z)^T = (x^T z)^2 \geq 0$$

(b)

$$N(A) = \{x \in \mathbb{R}^n : x^T z = 0\}$$

$$R(A) = R(zz^T) = 1$$

(c)

$$(BAB^T)^T = BA^T B^T = BAB^T$$

$$x^T BAB^T x = (x^T B)A(x^T B)^T \geq 0$$