(1) If $v$ is a normal vector to the plane $z = t$, then $v$ is in the plane. Since $v$ is normal to the plane, we have $v \cdot (a, b, c) = 0$, where $(a, b, c)$ is any point in the plane. Therefore, $v \cdot (a, b, c) = 0$. Let $v = (x, y, z)$ be a vector in the plane. Then, $v \cdot (a, b, c) = 0$.

(2) The orthogonal complement of the nullspace of the matrix $A$ is the multiplicative of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(3) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(4) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(5) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(6) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(7) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(8) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(9) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(10) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(11) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.

(12) The orthogonal complement of the nullspace of the matrix $A$ is the nullspace of the matrix $A^T A$. Let $v$ be a vector in the nullspace of $A$. Then, $A v = 0$. Therefore, $A^T A v = 0$. Hence, $v$ is in the nullspace of $A^T A$. Conversely, if $v$ is in the nullspace of $A^T A$, then $A^T A v = 0$. Therefore, $A v = 0$. Hence, $v$ is in the nullspace of $A$. Thus, the nullspace of $A^T A$ is the orthogonal complement of the nullspace of $A$.