Q 7.)

a.) The closure of Codd's relational operators for data processing results in a relation that can be used as input to another operator after the operators have been applied to a set of relations. This has benefits since it makes data processing effective and modular. If we have two relations A and B, for instance, we may use the selection operator on each relation to produce the subsets A' and B' before joining the two subsets to create a new relation C. The data can then be processed further by using additional operators on C, such as projection, grouping, or sorting. We can combine the operators in a variety of ways to get the desired outcomes since they maintain closure.

b.) Vector: Scalar multiplication, in which the vector is multiplied by a scalar quantity, is an operation that maintains closure. Taking the cross product of two vectors, which yields a vector that might not be orthogonal to the source vectors, is an operation that does not preserve closure.

Matrix: Matrix addition, which involves adding two matrices element-by-element, is an operation that protects closure. Matrix inversion is an operation that does not preserve closure and may produce a non-invertible matrix.

Complex Number: Addition, which involves combining two complex numbers component-by-component, is an operation that maintains closure. Taking a complex integer's square root is an operation that does not maintain closure, and the outcome can be a complex number with a non-real component.

Color: Color addition, which involves combining two colors component-by-component, is an operation that keeps closure. Color multiplication is an operation that does not preserve closure and may produce a color that is not in the RGB color space.