**Explain what hashing is and how it works. You will include a paragraph on rainbow hashing tables and how they work to protect the integrity of the data.**

In a nutshell, hashing is a process to convert a key to another value. By using a mathematical algorithm, a hash function is used to generate the new value. Good hash functions use a one-way hash algorithm so that the hashed value may not be reverted to it’s original key. A hash algorithm needs to be fast to be efficient, but if it is too fast than it can be easier to crack through brute force. As with any means to secure something, hashing algorithms need to be improved upon as time goes by. For example, the md5 hash algorithm is almost useless anymore because you can google the hashed value and it will provide plaintext options for possible original keys. This is largely due to collisions. If one is able to intercept a “message” and alter it without changing the hash value, then let that altered data continue to it’s destination, then the recipient has no way of knowing it was not the original because the hash matches.

Rainbow tables are text files that contain predetermined hash keys with their plaintext value. These rainbow tables may have any number of key/value pairs and is used for comparison against the hash values one is trying to solve against. As to how rainbow tables may be used to protect data integrity, they provide professionals to quickly audit the systems they are responsible for maintaining.