Quiz 2

1. Name and describe one of the 3 key properties of data.
   a. Data is *raw*: Storing data in it's rawest form is valuable because you do not know ahead of time all the questions you would like to have answered. It's better to store the raw data rather than semantically normalized forms as your normalization algorithms may improve over time.
   b. Data is *immutable*: Immutability implies that data is not updated or deleted, it is only appended to. By having immutable data, you gain the benefits of human-fault tolerance, because you can't delete or incorrectly modify data, and simplicity, since updating data requires appropriately indexing it for retrieval.
   c. Data is *eternally true*: By adding timestamps to each piece of data, you keep a separate record each time information changes. This allows you to reconstruct the history of events rather than just storing a snapshot of the world at a specific point in time.

2. Name and describe one of the benefits of the fact based model.
   a. We can answer questions about the dataset at any time in its history since we're storing the entire history of events.
   b. By only appending to our dataset, we achieve human fault-tolerance.
   c. Since we're storing data as atomic facts in separate tables, we can handle partial information without having to store NULL values. A NULL value is implied by data not existing.
   d. By storing data in both the batch and serving layers, we reap the benefits of storing our data in both normalized and denormalized forms.

3. What is a benefit of using an enforceable scheme over a more flexible format like JSON?
   a. An enforceable schema rigorously defines the structure of your facts and requires a bit more work upfront, but guarantees that all required fields will be present and ensures that all values are of the expected type. Hence, errors will be raised when creating a piece of data at runtime, rather than when performing analysis later on. The schema can also evolve as different types of data become available, for instance, as a business grows or changes.