1. Is the definition of a FD applicable for XML Schema? Can the 2 procedures apply to XML schema also?

   Proposed answer.

   The definition of a FD is applicable for XML Schema.

   Since, XML Schema will be used to describe the structure of an XML document as DTD. By applying FD in designing XML Schema, we can prevent data redundancy within the XML file which using the XML Schema.

   The 2 procedures can also apply to XML Schema.

   - *If an attribute @a or S data carry information about a property that belongs solely to element B, we create a new element that will contain only specific information about the element B (including the attribute @a or S data) and reference that new element from within old element B*

     With XML Schema, we can define a new element (element B) and put those attribute @a or S data within it. In order to ensure the referential integrity, we can use the key & keyref to link the element A & B. Meanwhile, by using unique constraint to ensure unique identify is being used and prevent nil.

   - *If an attribute @a or S data carry information about a property that belongs solely to the element A, we move it to the element A:*

     In XML Schema, we can move those attribute @a <xs:attribute> or S data <xs:element> from element B to element A.

2. Consider the XML Schema file in Figure 1.
    a. Provide a valid XML file with the fewest elements.
    b. Suggest a modification of the given schema file so as to define a key for the reservation element with keyref. The key should be a compound key of flight ID and date.

Proposed answer.

a) A sample XML file.

```
<records>
 <Airport airId = "A123">
  <name>Airport 1</name>
  <fee>1000.00</fee>
 </Airport>
 <Airport airId = "B123">
  <name>Airport 2</name>
  <fee>2000.00</fee>
 </Airport>
 <Flight flightId = "A1234">
  <seats>1234</seats>
  <date>2010-01-01</date>
  <source>Hong Kong</source>
  <destination>England</destination>
 </Flight>
</records>
```

b) The modified schema file is:

```
<xs:schema>
 ......
 <xs:element name = "records">
  .....
  <xsd:key name = "stPrimKey">
   <xsd:selector xpath = "Flight" />
   <xsd:field xpath = "date" />
   <xsd:field xpath = "@flightId" />
  </xsd:key>
  <xsd:keyref name = "refKey" refer = "stPrimKey">
   <xsd:selector xpath = "Reservation" />
   <xsd:field xpath = "date" />
   <xsd:field xpath = "flightRef" />
  </xsd:key>
 </xs:element>
</xs:schema>
```

```
<?xml version="1.0" encoding="UTF-8"?>
    <xs:schema>
    <xs:element name="Passenger">
            <xs:complexType> <xs:sequence>
            <xs:element name="name" type="xs:string"/>
            <xs:element name="retCard" type="xs:string"/>
            <xs:element name="homeTown" type="xs:string"/>
            </xs:sequence> </xs:complexType>
    </xs:element>

    <xs:element name="Flight">
            <xs:complexType><xs:sequence>
            <xs:element name="seats" type= ”xs:int”/>
            <xs:element name= date" type="xs:date"/>
            <xs:element name="source" type="xs:string"/>
            <xs:element name="destination" type="xs:string"/>
            </xs:sequence>
            <xs:attribute name="flightId">
                    <xs:simpleType> <xs:restriction base="xs:string">
                            <xs:minLength value="0"/><xs:maxLength value="5"/>
                    </xs:restriction></xs:simpleType>
            </xs:attribute>
    </xs:complexType> </xs:element>

    <xs:element name="Airport">
            <xs:complexType><xs:sequence>
                    <xs:element name="name" type="xs:string"/>
                    <xs:element name="fee" type="xs:float"/>
            </xs:sequence>
            <xs:attribute name="airId" type=”xs:string”/>
    </xs:complexType> </xs:element>

    <xs:element name="Reservation">
            <xs:complexType><xs:sequence>
                    <xs:element name="date" type="xs:date"/>
                    <xs:element name="flightRef" type="xs:string"/>
                    <xs:element name="passRef" type="xs:string"/>
            </xs:sequence> </xs:complexType>
    </xs:element>

    <xs:element name="records">
            <xs:complexType> <xs:sequence>
                    <xs:element ref="Airport" minOccurs="2" maxOccurs="unbounded" />
                    <xs:element ref="Flight" minOccurs="1" maxOccurs="unbounded" />
                    <xs:element ref="Passenger" minOccurs="0" maxOccurs="unbounded" />
                    <xs:element ref="Reservation" minOccurs="0" maxOccurs="unbounded" />
            </xs:sequence> </xs:complexType>
    </xs:element>
    </xs:schema>
```

Figure 1.