1. (14 points) Of the following statements, identify all that hold about e-business concepts.

A. Autonomy and heterogeneity are two names for the same concept
   
   **Solution:** A is false: autonomy deals with action and heterogeneity with design and construction, so they are quite different

B. Dealing with open systems is difficult because they require us to construct tightly integrated solutions
   
   **Solution:** B is false: open systems do not require integrated solutions; arms-length relationships are the best way to develop solutions for open systems

C. A TP monitor cannot necessarily ensure consistency among the resources that it controls
   
   **Solution:** C is false: to ensure consistency is the main function of a TP monitor; the resources a TP monitor controls would reside within the same administrative domain

D. In open environments, coherence is a more reasonable goal than consistency
   
   **Solution:** D is true:

E. The dynamism of an IT system refers to the freedom of system administrators to alter the configurations of the modules in the system
   
   **Solution:** E is true:

F. In a nutshell, what makes open business environments difficult to deal with are sociopolitical and historical factors such as that different business partners are free to act as they please and their business modules may be implemented in diverse ways
   
   **Solution:** F is true:

G. Some techniques that address closed environments may also be applied in open environments and can help improve robustness and productivity
   
   **Solution:** G is false:

2. (18 points) Of the following statements, identify all that hold about metadata and XML.

A. To use information well requires capturing context, yet to reuse information well requires that we can capture its meaning in a context-free manner
   
   **Solution:** A is true: to reuse information presupposes that it holds some meaning even as the context of use changes

B. An XML namespace is not a resource and therefore it is bad practice to try to give it a URI
   
   **Solution:** B is false: anything can be treated as a resource and in particular a namespace makes an excellent resource
C. If we give a URI to an XML namespace, the URI resolves at the schema where the namespace is defined

Solution: C is false: a URI is just an identifier

D. Whereas in most beginner tutorials an XML document corresponds to exactly one tree, a complex XML document may correspond to two or more trees

Solution: D is false: always one tree

E. XML documents that cannot be parsed are useful for capturing browser interfaces and configuration data

Solution: E is false: XML documents that cannot be parsed are not XML documents, and are thus useless as XML

F. We sometimes cannot design XML documents that express important metadata for real-life situations, because XML doesn’t allow attributes to have attributes

Solution: F is false:

G. An element with no text, no attributes, and no subelements represents a null value

Solution: G is false: we need the xsi:nil attribute

H. Specifying units within attribute values as in `<bill amount='USD 10'/>` is desirable because the metadata USD makes sure the value 10 won’t be misinterpreted

Solution: H is false: we shouldn’t have to parse attribute values further; we should capture units via a separate attribute or instead use elements with appropriate subelements and attributes

I. Ultimately, any type of metadata can be useful only if the creators and readers of that metadata interpret it sufficiently similarly

Solution: I is true: there must be sufficient agreement or effective communication would be impossible

3. (18 points) Of the following statements, identify all that hold about XPath.

A. The XPath expression `child::Song[Sgr]` finds the Sgr elements that are children of the Song children of the context node

Solution: A is false: it finds Song elements that are children of the context node

B. The XPath expression `child::node()` would yield any of the nodes that `child::element()` yields

Solution: B is true:

C. XPath supports what might be termed the tags view of an XML document
Solution: C is false: it is the template view

D. XPath’s preceding axis helps find nodes that precede the context node, such as its preceding siblings, parent, and other ancestors

Solution: D is false: not its parent or other ancestors

E. The XPath child and parent axes are inverses of each other: each node is a child of its parent node

Solution: E is false: attributes are not

F. Every element in an XML document has a parent

Solution: F is true: even the top element has the document root (the / node) as its parent

G. If an XPath expression $E$ yields a node sequence consisting of exactly one element, then $E[1] = E[last()]$

Solution: G is true:

H. A node that has one or more children is always the parent of each of its children

Solution: H is true:

I. A node is always the descendant of each of its ancestors

Solution: I is false: attributes are not

4. (16 points) Of the following statements, identify all that hold about XQuery. (Below, Set and Pred are functions and $x$ and $v$ are variables.)

A. The collector variable paradigm for programming works in XQuery

Solution: A is true:

B. Any XQuery query that produces a result must include at least one for or let

Solution: B is false: only each FLWOR expression must include at least one for or let

C. Any FLWOR query that produces a nonempty result must include exactly one where clause

Solution: C is false: a where is optional

D. This course advocates using higher-level languages such as XQuery to extract information from XML documents

Solution: D is true: yes, strongly!
E. XML query languages such as XQuery draw upon previous work on query languages for object-oriented
databases

Solution: E is true:

F. XQuery shows how to query XML documents without using XML syntax

Solution: F is true:

G. Given for $x$ in Sequence . . ., where Sequence is some expression, if the body of the for terminates for
each possible binding of $x$, the entire for expression must terminate

Solution: G is false: the expression Sequence is calculated before the for line is executed so if the
calculation of the Sequence expression never terminates, the whole for expression won’t terminate
either

H. Given XQuery, a lot of XPath is redundant. For example, using no axes other than parent and child, we
can write an XQuery function that would compute the following siblings of its argument element

Solution: H is true:

5. (10 points) Of the following statements, identify all that hold about XSLT.

A. Using XSLT, we can easily modify an input XML document that obeys one schema to produce a docu-
ment that obeys an entirely different schema

Solution: A is false: the idea with XSLT is to produce a new document from an input, but there
are no modifications

B. A simple way to ensure that your XSLT stylesheet will terminate on all inputs is to only use the child,
following, following-sibling, descendant, and descendant-or-self axes in XPath expressions within the
stylesheet

Solution: B is false: can create an infinite loop through the descendant-or-self axis

C. The collector variable paradigm for programming works in XSLT

Solution: C is true:

D. It is possible to have two templates in the same stylesheet such that one template matches Song[1] and
the second template matches Song

Solution: D is true:

E. Any legal XPath expression, X, may be used as a pattern on which an XSLT template may match, i.e.,
we can write <xsl:template match='X'>…</xsl:template>

Solution: E is false: some XPath expressions are not valid patterns for matching templates; for
example, the expressions ‘55’ and ‘1+1’