

1. (12 points) Of the following statements, identify all that hold about e-business concepts.
- A. Electronic business forces interactions across administrative domains
 - B. Electronic business requires closed information systems to ensure security
 - C. Optimistic handling is a possible approach for handling global constraints
 - D. Some examples of essential global information in a distributed system are important overall constraints
 - E. Integration yields a single homogeneous entity for the integrated subsystems
 - F. Accommodating dynamism is desirable because of the difficulty of maintaining configurations by hand

Solution: A, C, D, E, F

2. (20 points) Of the following statements, identify all that hold about architecture.
- A. In the best information architectures, the best interconnections are COTS (commercial off-the shelf) products
 - B. Protocols help improve productivity by enhancing reuse
 - C. In practical settings, IT architectures are studied along with the human organizations by which system components are maintained
 - D. An enterprise model should describe the resources of the enterprise (i.e., its databases and such), but should not describe its business processes
 - E. Two-tier architectures separate presentation from business logic
 - F. An advantage of placing business logic in a separate tier is that it can be more easily inspected and modified
 - G. According to Vernadat, metadata registries have been superseded by relational databases in modern IT architectures
 - H. According to Zachman, process descriptions include both functional flows and data flows
 - I. According to Clark and Waclawsky, what usually drives the need for changing designs is the emergence of new products
 - J. According to Eric Yu, for Internet-based information systems, modeling techniques must accommodate considerations of what, where, when, how, *and* why

Solution: B, C, F, H, I, J

A is false because architectural interconnections are interfaces, not products

D is false because enterprise models should also describe the business processes

E is false because two-tier architectures separate presentation and business logic from data

3. (6 points) Of the following statements, identify all that hold about names, identifiers, and namespaces. (Below $N.n$ is a qualified name corresponding to a local name n defined in a namespace N .)
- A. The main prerequisite for a unique location scheme is the existence of an architecture by which locations can be resolved
 - B. If $N_1.n_1$ and $N_2.n_2$ are the same name, then N_1 and N_2 are the same namespace
 - C. If N_1 and N_2 are the same namespace, then $N_1.n_1$ and $N_2.n_1$ are the same name

Solution: A, B, C

B is true because namespaces don't partially overlap

C is true because a local name must have a unique qualified name in a namespace

4. (22 points) Of the following statements, identify all that hold about metadata, XML, and XML Schema.
- A. A stock quote is an example of metadata
 - B. Markup is one of the ways in which metadata may be supplied
 - C. Provenance metadata stores the origins rather than the proofs for the associated data
 - D. Metadata is desirable for technical reasons, but regulatory reasons often preclude using metadata
 - E. XML is the first standardized markup language
 - F. XML namespaces are the first kind of namespaces used in computer science
 - G. In an XML document, an element can sometimes be placed within an attribute
 - H. Although XML documents are structured as trees, XML Schema grammars are structured as graphs
 - I. In XML Schema, we can easily specify that a specific element occur no fewer than thirteen times
 - J. The XML Schema choice element is a compositor that functions as exclusive OR of its children
 - K. Empty elements are *not* the same as nil elements

Solution: B, C, I, J, K

A is false because a stock quote is the data

H is false because XML Schema grammars are well-formed XML documents

D is false because metadata is, if anything, more valuable for regulatory reasons

E is false because SGML predates XML

5. (16 points) Of the following statements, identify all that hold about XPath. (Below, E is an arbitrary XPath expression; i and j are positive integers.)
- A. The text() function extracts the first text node under the current element
 - B. If $i \neq j$, we never have $E[i][j] = E[j][i]$
 - C. The only cases where $E[i][j] = E[i]$ are when $i=j=1$
 - D. Assuming E does *not* evaluate to (), E/foo is never equal to E[foo]
 - E. XPath doesn't include recursive queries
 - F. The query `let $x := 1 return (2)[1]` produces a result of 2
 - G. In XPath, * abbreviates node()
 - H. $E[@lg]$ selects members of E for which attribute @lg is defined and is not equal to the empty string

Solution:

E is true: recursion doesn't quite make sense for XPath (recursion makes sense for XQuery, of course)

F is true: 2 is the first value of the sequence (2)

A is false: text() returns all text nodes

B is false: the two expressions are equal when i and j are larger than last()
C is false: both sides yield () when i is larger than last() in its context
D is false: E/foo selects all foo subelements for members of E whereas E[foo] selects members of E that have a subelement—and these are equal when both are empty, which is possible even when E is not empty
G is false: * stands for all elements
H is false: it just tests for the existence of an attribute even if its value is the empty string

6. (24 points) Of the following statements, identify all that hold about XQuery. (Below, Set and Pred are functions and \$x and \$v are variables.)
- A. Using no axes other than parent and child, we can write an XQuery function that would compute the *ancestors* of its argument element
 - B. The order of evaluation of bindings in XQuery's some and every clauses is implementation-dependent
 - C. XQuery will become a candidate recommendation of the W3C in 2008
 - D. If every \$x in Set(\$v) satisfies Pred(\$x,\$v) then some \$x in Set(\$v) satisfies Pred(\$x,\$v)
 - E. The Effective Boolean Value of a proper negative fraction such as -0.5 is true
 - F. The Effective Boolean Value of a string containing a proper negative fraction such as "-0.5" is neither true nor false
 - G. An easy way to swap values of \$x and \$y is let \$x := \$y followed immediately by let \$y := \$x
 - H. Consider a let clause with multiple variables. In such a clause, a positional variable (as in at \$pos) refers to the position of each variable being assigned
 - I. The snippet 5 is a valid XQuery query even though it is not an XML document
 - J. The snippet <foo>5</bar> is a valid XQuery query even though it is not an XML document
 - K. If you ever see \$x in an XQuery query, and the \$x is not placed within quotes, then the \$x is a variable
 - L. An executable XQuery query cannot contain any free variable

Solution: A, B, I, L

C is false: XQuery became a recommendation in January 2007
D is false: consider when Set(\$v) is empty
E is false: negative numerics have an effective boolean value of false
F is false: nonempty strings have an effective boolean value of true
G is false: it's not a swap
H is false: no positional variables for let
J is false: it's ill-formed
K is false: \$x placed in a return is interpreted as a string even though it is not in quotes