1. (28 points) Problems on agents
   
   A. Agents have an ability to enter into and break contracts
      
      **Solution:** A is true:
      
   B. A reactive agent can be understood as executing in a sense-decide-act loop
      
      **Solution:** B is true:
      
   C. Symbolic representation of knowledge is not a good match for application environments that consist of conventional information resources such as databases
      
      **Solution:** C is false:
      
   D. Understanding an agent’s internal state in terms of the traditional folk psychological cognitive concepts such as beliefs, desires, goals, and intentions has the advantage of providing a natural abstraction over low-level data structures
      
      **Solution:** D is true:
      
   E. Web services can potentially be understood to be the sensors of an agent who lives in an information environment
      
      **Solution:** E is true:
      
   F. A rational agent is a useful concept, but only where there is a direct action involving financial instruments
      
      **Solution:** F is false:
      
   G. An agent must always terminate or we would not be able to read its results
      
      **Solution:** G is false:
      
   H. Representations of services in OWL-S provide a basis for composing services through the application of automatic planning techniques
      
      **Solution:** H is true:
      
   I. The OWL-S control constructs such as sequence, split, and repeat provide a fundamentally different level of abstraction than traditional process constructs
      
      **Solution:** I is false:
      
   J. OWL-S service profile terms such as contact information and service name have no analog in traditional standards such as UDDI
      
      **Solution:** J is false:
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<thead>
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<tr>
<td>2.</td>
<td>(30 points) Problems on multiagent systems</td>
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<tr>
<td>A.</td>
<td>We can think of the knowledge base underlying a TMS as consisting of a database of facts and rules</td>
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<td>Solution:</td>
<td>A is true:</td>
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<tr>
<td>B.</td>
<td>The DTMS ensures consistency of shared beliefs among agents</td>
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<tr>
<td>Solution:</td>
<td>B is true:</td>
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<tr>
<td>C.</td>
<td>Once a belief is shared between two agents, the DTMS continues to ensure their consistency even if it might be better to forget about the sharing</td>
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<td>Solution:</td>
<td>C is true:</td>
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<tr>
<td>D.</td>
<td>A TMS can refuse to store premises that are inconsistent with its prior conclusions</td>
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<td>Solution:</td>
<td>D is false:</td>
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<tr>
<td>E.</td>
<td>A TMS can store an unjustified belief but only if that belief was previously justified and though its justification went away, that belief was never proved false</td>
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<td>Solution:</td>
<td>E is false:</td>
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<td>F.</td>
<td>In a system built using the DTMS if one agent represents a proposition (e.g., Bob is a preferred customer), then no other agent may represent its negation (e.g., Bob is not a preferred customer)</td>
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<tr>
<td>Solution:</td>
<td>F is false:</td>
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<tr>
<td>G.</td>
<td>A DTMS helps ensure robustness by undoing erroneous actions performed by a service</td>
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</table>
Solution: G is false:

H. The practically most effective notion of consistency across agents in a multiagent system would be global consistency

Solution: H is false:

I. In a typical usage of rules, an outgoing message would be part of the event specification and an incoming message would be part of the action

Solution: I is false:

J. A vendor who commits to providing refunds for returned goods suffers from the liability that a customer could claim a refund

Solution: J is true:

K. The legal concepts are interesting to us because we need a way to specify interactions among autonomous parties and a way to ensure that they are compliant

Solution: K is true:

L. Commitments, unlike beliefs, are conceptualized as a relationship between two parties and can thus serve as a basis for judging compliance

Solution: L is true:

M. A commitment may be released by its creditor but generally not be created by the creditor: in this sense, the creditor has the power to remove the duty of the debtor but generally not the power to impose a new duty upon the debtor

Solution: M is true:

N. An institution can be thought of as an organization that has a fixed identity of its own even though its membership may change (even entirely) over time

Solution: N is true:

O. Organizational models such as virtual enterprises help ensure the coherence of computations even in the face of exceptions and the resulting impact on business transactions

Solution: O is true:

3. (16 points) Problems on communications

A. We can place an incoming message as an antecedent of a rule and the commitment corresponding to the meaning of the message in the consequent of the rule

Solution: A is true:
B. If a protocol has a public parameter adorned \( \text{⌜out\⌝} \), then at least one of its constituent messages must have the same parameter bound \( \text{⌜out\⌝} \), or else the protocol would not be enactable

**Solution:** B is true:

C. If a protocol has a private parameter adorned \( \text{⌜out\⌝} \), then one of its constituent messages must have the same parameter bound \( \text{⌜in\⌝} \), or else the protocol would not be enactable

**Solution:** C is false: the parameter’s binding may not be used

D. For a protocol enactment to complete, each of its constituent messages must have been sent and received

**Solution:** D is false: all that matters is if all its public parameters are bound

E. The local state of an agent playing a role in a protocol is generally different from the internal state of the same agent

**Solution:** E is true:

F. A parameter must be adorned \( \text{⌜in\⌝} \), \( \text{⌜out\⌝} \), or \( \text{⌜nil\⌝} \), and cannot be left unadorned

**Solution:** F is false:

G. All the possible business meanings in any application domain can be captured by the handful of message types defined by existing agent communication languages such as FIPA’s

**Solution:** G is false:

H. One of the benefits of employing commitments as a basis for communication protocols is that they provide a standard of correctness that is independent of implementation details

**Solution:** H is true: