1. (8 points) Identify all of the following statements that are true about extended transaction models
   A. An extended transaction must have a vital subtransaction
   B. A vital subtransaction of extended transaction never needs to have a compensate defined, since if the vital subtransaction fails, the extended transaction is dead anyway
   C. If an extended transaction has exactly two subtransactions, exactly one of which is vital, then the vital subtransaction does not need a compensate defined
   D. If an extended transaction has exactly two subtransactions, neither of which is vital, then we can set things up so we need compensate for only one subtransaction

   Solution: C and D

2. (8 points) Which of the following statements are true about the transactional frameworks?
   A. A Business Transaction Protocol atom relaxes atomicity
   B. A Business Transaction Protocol cohesion relaxes atomicity and isolation
   C. A Business Transaction Protocol cohesion involves a special role called the BTP Composer
   D. A Business Transaction Protocol atom has the same behavior as a WS-AtomicTransaction

   Solution: B and C

3. (8 points) Identify all correct expressions that capture the following specification involving event computations:
   If both $e$ and $f$ occur, then $g$ occurs in between $e$ and $f$
   A. $\pi \lor \neg \exists f \forall e \land g \lor f \land g \land e$
   B. $e \land g \land f \land g \land e$
   C. $\pi \lor \neg \exists f \forall e \land g \land g \land e$
   D. $(\pi \lor \neg \exists f \forall e \land g \land f) \land (\pi \lor \neg \exists f \forall e \land g \land e)$

   Solution: A
   D is false; it would be true if the operator between the two parenthesized expressions were $\lor$ instead of $\land$

4. (8 points) Identify all correct expressions that capture the following:
   Given that $e$ is immediate, the dependency $\pi \lor g \land e$ strengthens to the following dependency:
   A. $\pi \lor g \land e$
   B. 0
   C. $g \land e$
   D. $e \land \neg \pi$

   Solution: B and D
   Notice that D is identical to B in terms of meaning. For the homework grading, however, we will entertain D as not being checked because some students interpreted the problem to refer to the syntax of the expression generated, not its meaning.