

1) (4 pts) Can the following predicates be unified? If yes, provide the unifier.

- (a) $P(A, B), P(x, x)$
- (b) $P(A, x), P(x, B)$
- (c) $P(F(A, x), x), P(y, B)$
- (d) $P(A, x, F(A, y)), P(z, F(z, y), F(A, B))$.

2) (3 pts) The following Prolog code defines a predicate P .

```
P(X, [X|Y]).  
P(X, [Y|Z]) :- P(X, Z).
```

What is the truth value of the following predicates: $P(1, [2, 3, 1])$, $P(1, [2, 3, 4])$, and $P(A, [1, 2, 3])$? Recall that X, Y, Z, A are variables. Is A bound to anything? What list operation is predicate P implementing, if any?

3) (3 pts) Let $F(x, y, z)$ be the parity boolean function on three variables that returns true if and only if an even number of the boolean arguments have value 1. What is the decision tree that encodes this function perfectly? What shape do you expect the learning curve will have for this function? Explain your answer.