Introduction to Software Verification 236342, Homework 1

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1

A. Correct. Since the precondition is false, the postcondition is 'always' satisfied (since it is never tested).

B. Incorrect. Counterexample $x = -100, y = -99$:

- $l_0, -100, -99$
- $l_1, -100, -99$
- $l_2, -100, -99$
- $l_3, -1, -99$
- $l_*, -1, -99$

As can be seen, precondition is satisfied and postcondition is not.

C. Correct. The postcondition is true, so regardless of anything else, for every input selection it will be evaluated as true (the program does not even have to terminate either).

D. Incorrect. Counterexample $x = 1, y = 9$:

- $l_0, 1, 9$
- $l_1, 1, 9$
- $l_2, -8, 9$
- $l_3, -8, 9$
- $l_*, -8, 9$

Postcondition is false, so it is not satisfied.

E. Incorrect. Counterexample $x = 1, y = 3$:

- $l_0, 1, 3$
- $l_1, 1, 3$

- $l_2, 1, 3$
- $l_3, -2, 3$
- $l_4, -2, 3$
- $l_1, -2, -3$
- $l_2, -2, -3$
- $l_3, -2, -3$
- $l_4, -2, -3$
- $l_1, -2, 3$
- $l_2, -2, 3$
- $l_3, -5, 3$
- $l_4, -5, 3$

F. Incorrect. Counterexample $x = 1, y = 2$, By running this example we see that the program gets stuck in a loop at labels l_1, l_2, l_3, l_4. And each 4 iterations result with the state being the same as the initial state at l_1. Since this is a total correcness condition on the specification, the correctness is contredicted by the program failing to terminate.