Informal Description:

(Initialize) The input of this Turing Machine is a binary string flanked by one x character on each edge, and the output is the binary string shifted right by one bit and also flanked by one x character on each edge. Assuming the input is correctly formatted and cannot be empty.

（**Shift Binary String to the right by one bit**） We start from state q0, scanning the tape from the leftmost, when we see an x, moving the head to right once to state q1. Continue scanning the tape, if it's not x move the head to the right until we see an x which means we reach the end of the input tape, moving the head to left once and getting into state q2, no matter what character the head is pointing at, moving the head to left once and getting into state q3. At state q3, we have three options:

(1) An x is met, moving the head to right once and getting into state q4, no matter what character the head is pointing at, change the character to 0 and move the head to left once(pointing at the leftmost x). Therefore, it gets into q_halt, and we claim the shifting binary string to the right by one bit succeeds and the output has been accepted.

(2)A 0 is met, moving the head to right once and getting into state q5, no matter what character the head is pointing at, change the character to 0 and move the head to left once and get into state q7, no matter what character is met move the head to left once back to q3. There are three situations:

(a.) An x is met, moving the head to right once and getting into state q4, no matter what character the head is pointing at, change the character to 0 and move the head to left once(pointing at the leftmost x). Therefore, it gets into q_halt, and we claim the shifting binary string to the right by one bit succeeds and the output has been accepted.

(b.) A 0 is met, follow the same steps(in (2)) above from states q3--q5--q7 until we see an x, moving the head to right once and getting into state q4, no matter what character the head is pointing at, change the character to 0 and move the head to left once(pointing at the leftmost x). Therefore, it gets into q_halt, and we claim the shifting binary string to the right by one bit succeeds and the output has been accepted.

(c.) A 1 is met, moving the head to right once and getting into state q6, no matter what character we met, change it to 1 then move the head to the left once and get into state q7, no matter what character the head is pointing to, moving the head to left and getting into q3, we follow the same steps above from (2a) to (2c) until we see an x, then we follow the steps in (1)

(3) A 1 is met, moving the head to right once and getting into state q6, no matter what character we met, change it to 1 then move the head to the left once and get into state q7, no matter what character the head is pointing to, moving the head to left and getting into q3, then we follow the steps above from(2a) to (2c)

Result Discussion: Therefore, by the examples, edge cases, and how this Turing Machine went, we can conclude that this Turing Machine that implements the SHIFT instruction succeeds. The input is a binary string flanked by one x character on each edge, and the output is the binary string shifted right by one bit and also flanked by one x character on each edge.