Describe algorithms for the following problems. The input for each problem is string \( \langle M, w \rangle \) that encodes a standard (one-tape, one-track, one-head) Turing machine \( M \) whose tape alphabet is \( \{0, 1, \square\} \) and a string \( w \in \{0, 1\}^* \).

1. Does \( M \) accept \( w \) after at most \( |w|^2 \) steps?
2. If we run \( M \) with input \( w \), does \( M \) ever move its head to the right?

2\( \frac{1}{2} \). If we run \( M \) with input \( w \), does \( M \) ever move its head to the right twice in a row?

2\( \frac{3}{4} \). If we run \( M \) with input \( w \), does \( M \) move its head to the right more than \( 2^{|w|} \) times?

3. If we run \( M \) with input \( w \), does \( M \) ever change a symbol on the tape?

3\( \frac{1}{2} \). If we run \( M \) with input \( w \), does \( M \) ever change a \( \square \) on the tape to either 0 or 1?

4. If we run \( M \) with input \( w \), does \( M \) ever leave its start state?

In contrast, as we will see later, the following problems are all undecidable!

1. Does \( M \) accept \( w \)?

1\( \frac{1}{2} \). If we run \( M \) with input \( w \), does \( M \) ever halt?

2. If we run \( M \) with input \( w \), does \( M \) ever move its head to the right three times in a row?

3. If we run \( M \) with input \( w \), does \( M \) ever change a \( \square \) on the tape to 1?

3\( \frac{1}{2} \). If we run \( M \) with input \( w \), does \( M \) ever change either 0 or 1 on the tape to \( \square \)?

4. If we run \( M \) with input \( w \), does \( M \) ever reenter its start state?