Theory of Computation, CSCI 438 spring 2022
Polynomial Time, pg. 284-291, April 25

Definition 7.12 (page 286) P is the class of languages that are decided in polynomial time on a deterministic single tape TM. In other words,

$$P = \bigcup_k TIME(n^k)$$

The class P is important because:

1. P is invariant for all models that are polynomially equivalent to the deterministic single-tape TM, and
2. P roughly corresponds to the class or problems that are realistically solvable on a computer.

To determine membership in P

1. The number of steps in the algorithm must be a polynomial
2. Each step must run in polynomial time

(Also use a reasonable encoding of the input. For example, encoding integers in unary is not considered reasonable because that would be exponentially larger than a reasonable encoding such as base k, for any $k \geq 2$.)