Exercise 3-1:

a. Answer :

$\because \forall c > 0, \exists n_0 \in N^*, s.t. \ \forall n > n_0, 0 \le p(n) \le cn^k$

$\therefore p(n) = O(n^k)$

b. Answer :

$\because \forall c > 0, \exists n_0 \in N^*, s.t. \ \forall n > n_0, 0 \le cn^k \le p(n)$

$\therefore p(n) = \Omega(n^k)$

c. Answer :

$\because \forall c_1, c_2 > 0, c1 < c2, \exists n_0 \in N^*, s.t. \ \forall n > n_0, c_1 n^k \le p(n) \le c_2 n^k$

$\therefore p(n) = \Theta(n^k)$

d. Answer :

$\because \forall c > 0, \exists n_0 \in N^*, s.t. \ \forall n > n_0, 0 \le p(n) < cn^k$

$\therefore p(n) = o(n^k)$

e. Answer :

$\because \forall c > 0, \exists n_0 \in N^*, s.t. \ \forall n > n_0, 0 \le cn^k < p(n)$

$\therefore p(n) = \omega(n^k)$