

$$E = \left\{ \frac{1}{2}, \frac{2}{3}, \frac{3}{4}, \dots \right\}$$

$$E^c = (-\infty, \frac{1}{2}) \cup (\frac{1}{2}, \frac{2}{3}) \cup (\frac{2}{3}, \frac{3}{4}) \cup \dots \cup [1, \infty)$$

closed

open

$\Rightarrow E^c$ is not open

See here
it is closed

not open

$\Rightarrow E$ is not closed.