

## Exercise 14.0

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### 1. Find the interior points, exterior points and boundary points of the following sets.

(1)  $E = \{(x, y) | 0 < x^2 + y^2 < 1\}$

The set of interior points is

$$E^\circ = \{(x, y) | 0 < x^2 + y^2 < 1\}$$

The set of exterior points is

$$\{(x, y) | x^2 + y^2 > 1\}$$

The set of boundary points is

$$\partial E = \{(x, y) | x^2 + y^2 = 1\} \cup (0, 0)$$

(2)  $F = \{(x, y) | x, y \text{ are both rational numbers}\}$

The set of interior points is

$$F^\circ = \emptyset$$

The set of exterior points is

$$\{(x, y) | x \in R \text{ and } y \in R\}$$

The set of boundary points is

$$\partial F = \{(x, y) | x \in R \text{ and } y \in R\}$$

(3)  $A = \{(x, y) | y < x^2\}$

The set of interior points is

$$A^\circ = \{(x, y) | y < x^2\}$$

The set of exterior points is

$$\{(x, y) | y > x^2\}$$

The set of boundary points is

$$\partial A = \{(x, y) | y = x^2\}$$

(4)  $B = \{(x, y) | 1 \leq \frac{x^2}{3} + \frac{y^2}{4} < 5\}$

The set of interior points is

$$B^\circ = \{(x, y) | 1 < \frac{x^2}{3} + \frac{y^2}{4} < 5\}$$

The set of exterior points is

$$\{(x, y) | \frac{x^2}{3} + \frac{y^2}{4} < 1\} \cup \{(x, y) | \frac{x^2}{3} + \frac{y^2}{4} > 5\}$$

The set of boundary points is

$$\partial B = \{(x, y) | \frac{x^2}{3} + \frac{y^2}{4} = 1\} \cup \{(x, y) | \frac{x^2}{3} + \frac{y^2}{4} = 5\}$$