

1. Determine the domain and range of the function $f(x, y) = 5\sqrt{xy}$.
- A) domain: $\{x, y \mid x \geq 0, y \geq 0\}$, range: $\{z \mid z \geq 0\}$
- B) domain: $\{x, y \mid x \leq 0, y \leq 0\} \cup \{x, y \mid x \geq 0, y \geq 0\}$, range: all reals
- C) domain: $\{x, y \mid x \geq 0, y \geq 0\}$, range: all reals
- D) domain: $\{x, y \mid x \geq 0, y \leq 0\} \cup \{x, y \mid x \leq 0, y \geq 0\}$, range: $\{z \mid z \geq 0\}$

Ans: B

Difficulty: Easy

2. Determine the domain and range of the function $f(x, y) = \frac{13}{x^2 + y^2}$.
- A) domain $\{x, y \mid (x, y) = 0\}$, range: $\{z \mid z < 0\}$
- B) domain $\{x, y \mid (x, y) \neq 0\}$, range: $\{z \mid z < 0\}$
- C) domain $\{x, y \mid (x, y) \neq 0\}$, range: $\{z \mid z > 0\}$
- D) domain $\{x, y \mid (x, y) = 0\}$, range: $\{z \mid z > 0\}$

Ans: (C)

Difficulty: Easy

3. Determine the domain and range of the function $f(x, y) = \ln(19 - xy)$.
- A) domain: $\{x, y \mid xy \geq 13\}$, range: $\{z \mid z > 0\}$
- B) domain: $\{x, y \mid xy \geq 13\}$, range: all reals
- C) domain: $\{x, y \mid xy > 13\}$, range: $\{z \mid z > 0\}$
- D) domain: $\{x, y \mid xy < 13\}$, range: all reals

Ans: D

Difficulty: Easy

4.

$$f(x, y) = \frac{12}{\sqrt{y - x^2}}$$

Determine the domain and range of the function

- A) domain: $\{(x, y) \mid y < x^2\}$, range: $\{z \mid z < 0\}$
- B) domain: $\{(x, y) \mid y > x^2\}$, range: $\{z \mid z < 0\}$
- C) domain: $\{(x, y) \mid y > x^2\}$, range: $\{z \mid z > 0\}$
- D) domain: $\{(x, y) \mid y < x^2\}$, range: $\{z \mid z > 0\}$

Ans: (C)

Difficulty: Easy

5.

$$f(x, y) = \frac{\sqrt{36 - x^2}}{1 + \sqrt{1 - y^2}}$$

Determine the domain and range of the function

- A) domain $\{(x, y) \mid -7 \leq x \leq 7, -1 \leq y \leq 1\}$, range: $\{z \mid z < 6\}$
- B) domain $\{(x, y) \mid -4 \leq x \leq 4, -1 \leq y \leq 1\}$, range: all reals
- C) domain: $\{(x, y) \mid x > 0, y > 0\}$, range: $\{z \mid z > 0\}$
- D) domain: $\{(x, y) \mid x > 0, y > 0\}$, range: all reals

Ans: (A)

Difficulty: Easy

6.

Determine the domain and range of the function $f(x, y) = \ln xy$.

- A) domain: $\{(x, y) \mid x > 0, y > 0\} \cup \{(x, y) \mid x > 0, y < 0\}$, range: all reals
- B) domain: $\{(x, y) \mid x > 0, y < 0\} \cup \{(x, y) \mid x < 0, y < 0\}$, range: all reals
- C) domain: $\{(x, y) \mid x > 0, y > 0\} \cup \{(x, y) \mid x < 0, y < 0\}$, range: all reals
- D) domain: $\{(x, y) \mid x < 0, y > 0\} \cup \{(x, y) \mid x < 0, y < 0\}$, range: all reals

Ans: (C)

Difficulty: Easy

7.

$$f(x, y) = \frac{11}{\sqrt{36 - (x^2 + y^2)}} .$$

Determine the domain and range of the function

- A) domain: $\{(x, y) \mid x^2 + y^2 < 6\}$, range all reals
- B) domain: $\{(x, y) \mid x^2 + y^2 > 0\}$, range $\{z \mid z > 0\}$
- C) domain: $\{(x, y) \mid x^2 + y^2 < 6\}$, range $\{z \mid z > 0\}$
- D) domain: $\{(x, y) \mid x > 0, y > 0\}$, range $\{z \mid z > 0\}$

Ans: C

Difficulty: Easy

8.

Determine the domain and range of the function $f(x, y) = \sqrt{81 - x^2} - \sqrt{49 - y^2}$.

- A) domain: $\{(x, y \mid -2 \leq x \leq 2, -10 \leq y \leq 10)\}$, range: all reals
- B) domain: $\{(x, y \mid -3 \leq x \leq 3, -10 \leq y \leq 10)\}$, range: all reals
- C) domain: $\{(x, y \mid -4 \leq x \leq 4, -10 \leq y \leq 10)\}$, range: all reals
- D) domain: $\{(x, y \mid -5 \leq x \leq 5, -10 \leq y \leq 10)\}$, range: all reals

Ans: (C)

Difficulty: Easy

9.

Determine the domain and range of the function $f(x, y, z) = \cos x + \cos y + \cos z$.

- A) domain: \mathfrak{R}^3 , range: $[-3, 3]$
- B) domain: \mathfrak{R}^3 , range $[-1, 1]$
- C) domain: $\{(x, y, z) \mid 0 \leq x \leq 2\pi, 0 \leq y \leq 2\pi, 0 \leq z \leq 2\pi\}$, range $[-3, 3]$
- D) domain: $\{(x, y, z) \mid 0 \leq x \leq 2\pi, 0 \leq y \leq 2\pi, 0 \leq z \leq 2\pi\}$, range $[-1, 1]$

Ans: A

Difficulty: Easy

10.

$$f(x, y) = \frac{e^x - e^y}{e^x + e^y}.$$

Determine the domain and range of the function

- A) domain: all reals, range: $[-1, 1]$
- B) domain: all reals, range: $[-2, 2]$
- C) domain: all reals, range: $[-3, 3]$
- D) domain: all reals, range: $[-4, 4]$

Ans: (A)

Difficulty: Easy