

Topic: Limit of a multivariable function**Question:** If the limit exists, find its value.

$$\lim_{(x,y) \rightarrow (1,1)} \frac{xy}{x^2 + 2y}$$

Answer choices:

A 1

B $\frac{1}{3}$ C $\frac{1}{2}$

D Does not exist (DNE)



Solution: B

Before anything else, we always want to try evaluating the limit at the point it approaches.

The limit exists if the answer is a real number or infinite.

The limit does not exist if the function is discontinuous at the point it approaches.

We'll evaluate the limit at the point it approaches.

$$\lim_{(x,y) \rightarrow (1,1)} \frac{xy}{x^2 + 2y}$$

$$\frac{(1)(1)}{(1)^2 + 2(1)}$$

$$\frac{1}{3}$$

Since we get a real-number answer, the limit exists, and the limit of the function is $1/3$ as we approach $(1,1)$.



Topic: Limit of a multivariable function**Question:** If the limit exists, find its value.

$$\lim_{(x,y,z) \rightarrow (1,1,1)} \frac{xy + 4z}{2z - x^2 + y}$$

Answer choices:

- A $\frac{5}{2}$
- B 2
- C 5
- D Does not exist (DNE)



Solution: A

Before anything else, we always want to try evaluating the limit at the point it approaches.

The limit exists if the answer is a real number or infinite.

The limit does not exist if the function is discontinuous at the point it approaches.

We'll evaluate the limit at the point it approaches.

$$\lim_{(x,y,z) \rightarrow (1,1,1)} \frac{xy + 4z}{2z - x^2 + y}$$

$$\frac{(1)(1) + 4(1)}{2(1) - (1)^2 + (1)}$$

$$\frac{5}{2}$$

Since we get a real-number answer, the limit exists, and the limit of the function is $5/2$ as we approach $(1,1,1)$.

