

Topic: Limits of combinations

Question: If $f(x) = x - 5$ and $g(x) = 3$, evaluate the limit.

$$\lim_{x \rightarrow 2} [f(x) - g(x)]$$

Answer choices:

A $\lim_{x \rightarrow 2} [f(x) - g(x)] = 6$

B $\lim_{x \rightarrow 2} [f(x) - g(x)] = -6$

C $\lim_{x \rightarrow 2} [f(x) - g(x)] = 0$

D $\lim_{x \rightarrow 2} [f(x) - g(x)] = \infty$



Solution: B

We'll start by distributing the limit across the combination.

$$\lim_{x \rightarrow 2} [f(x) - g(x)]$$

$$\lim_{x \rightarrow 2} f(x) - \lim_{x \rightarrow 2} g(x)$$

$$\lim_{x \rightarrow 2} (x - 5) - \lim_{x \rightarrow 2} (3)$$

Now we'll substitute the value we're approaching into each function.

$$(2 - 5) - (3)$$

$$-3 - 3$$

$$-6$$



Topic: Limits of combinations

Question: If $f(x) = x^3$ and $g(x) = 2 - x^2$, evaluate the limit.

$$\lim_{x \rightarrow 3} 2f(x)g(x)$$

Answer choices:

- A $\lim_{x \rightarrow 3} 2f(x)g(x) = 189$
- B $\lim_{x \rightarrow 3} 2f(x)g(x) = -189$
- C $\lim_{x \rightarrow 3} 2f(x)g(x) = 378$
- D $\lim_{x \rightarrow 3} 2f(x)g(x) = -378$



Solution: D

We'll start by distributing the limit across the combination.

$$\lim_{x \rightarrow 3} 2f(x)g(x)$$

$$\lim_{x \rightarrow 3} 2f(x) \lim_{x \rightarrow 3} g(x)$$

$$2 \lim_{x \rightarrow 3} f(x) \lim_{x \rightarrow 3} g(x)$$

$$2 \lim_{x \rightarrow 3} (x^3) \lim_{x \rightarrow 3} (2 - x^2)$$

Now we'll substitute the value we're approaching into each function.

$$2(3^3)(2 - 3^2)$$

$$2(27)(-7)$$

$$-378$$



Topic: Limits of combinations

Question: If $f(x) = x^2 + 2x + 1$ and $g(x) = x - 1$, evaluate the limit.

$$\lim_{x \rightarrow -1} \frac{f(x)}{4g(x)}$$

Answer choices:

A $\lim_{x \rightarrow -1} \frac{f(x)}{4g(x)} = -\infty$

B $\lim_{x \rightarrow -1} \frac{f(x)}{4g(x)} = \infty$

C $\lim_{x \rightarrow -1} \frac{f(x)}{4g(x)} = 0$

D The limit does not exist (DNE)



Solution: C

We'll start by plugging $f(x)$ and $g(x)$ into the limit.

$$\lim_{x \rightarrow -1} \frac{f(x)}{4g(x)}$$

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

Now we'll substitute the value we're approaching into the function.

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

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

$$\frac{0}{-8}$$

$$0$$

