Introduction of Limit

To understand what limits are, let's look at an example. We start with the function .

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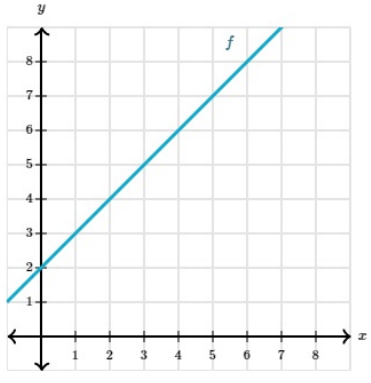
Example

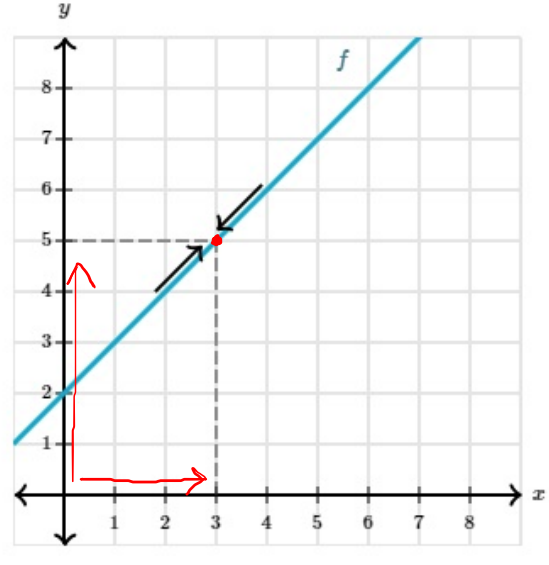
$$f(x) = x + 2.$$



The limit of f at x=3 is the value f approaches as we get closer and closer to x=3 . Graphically, this is the y-value we approach when we look at the graph of f and get closer and closer to the point on the graph where x=3

if we start at x=1 and move to the right until we get really close to 3, then y-value will be move closer to ***5***

For these reasons we say that the limit of ***f*** at x=3 is 5

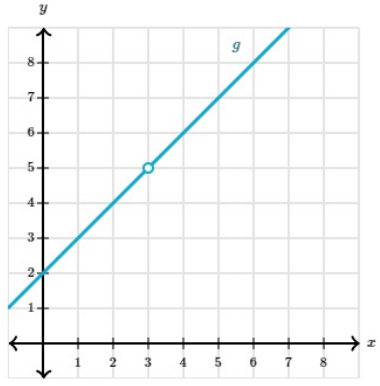


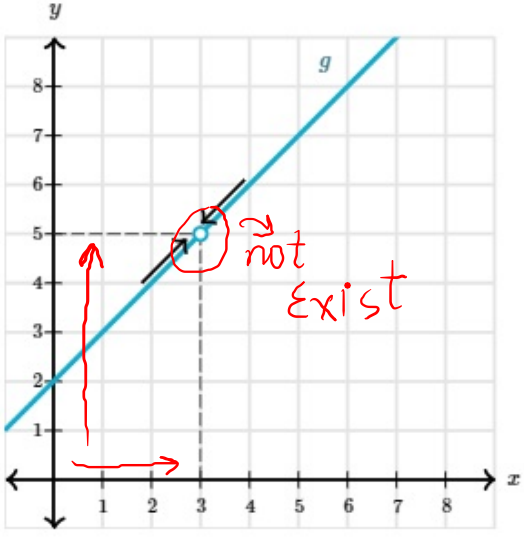
- **Difference between the limit of *f* at x=3 and the value of *f* at x=3. *i.e f(3)***

Example

Let g be a graph given here.

This function is the same as f=x+2 in every way except that it's undefined at x=3 .





Limit of f at x=3

The limit of g at x=3 is 5 .
That's because we can still get very very close to 3 and the function's values will get very very close to 5.So the limit of f at x=3 is equal to 5.

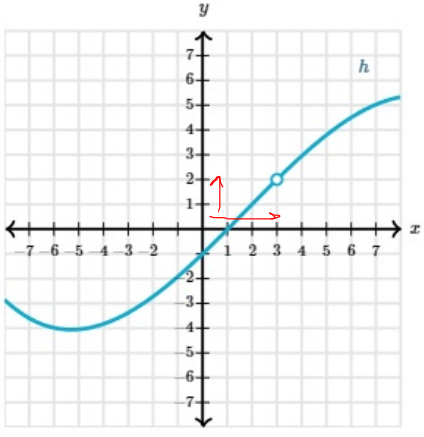
The value of f at x=3 i.e f(3)

But the value of at x=3 is undefined! according to graph

That's the beauty of limits: they don't depend on the actual value of the function at the limit. They describe how the function behaves when it gets close to the limit.

Q1.

This is the graph of h.



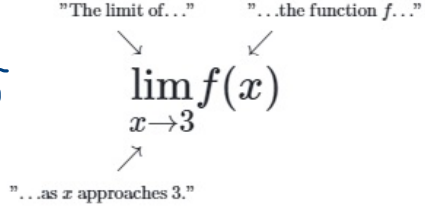
What is a reasonable estimate for the limit of h at $x = 3$?

As we go closer to 3
f is go closer to 2
So
$\lim_{x \to 3} f(x) = 2$

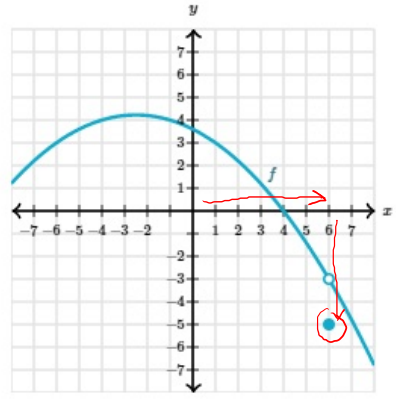
Notation :

This is how we would write the limit of f as x approaches to 3

$\lim_{x \to 3} f(x) = 5$



Q2.



What is a reasonable estimate for $\lim_{x \to 6} f(x)$?

As we go closer to 6, f(x) go closer to 5
So $\lim_{x \to 6} f(x) = 5$

Q3

Which expression represents the limit of x^2 as x approaches 5?

Choose 1 answer:

(A) $\lim 5^2$

(B) $\lim_{x^2 \to 5}$

(C) $\lim_{x \to 5} x^2$

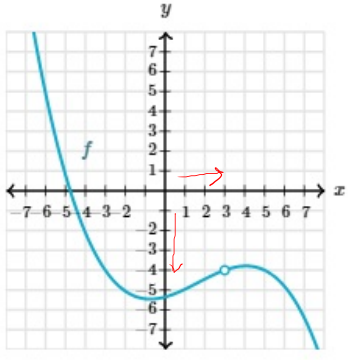
(D) $\lim_{x \to 25} x$

Estimating limit values from graphs

Examples

Q1

The function f is defined for all real numbers except for $x = 3$.

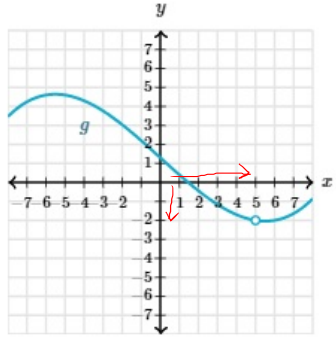


What is a reasonable estimate for $\lim_{x \to 3} f(x)$?

$\lim_{x \to 3} f(x) = 4$

Q2

The function g is defined for all real numbers except for $x = 5$.

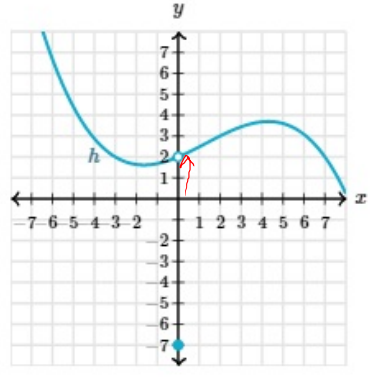


What is a reasonable estimate for $\lim_{x \to 5} g(x)$?

$\lim_{x \to 5} g(x) = 2$

Q3

The function h is defined for all real numbers.

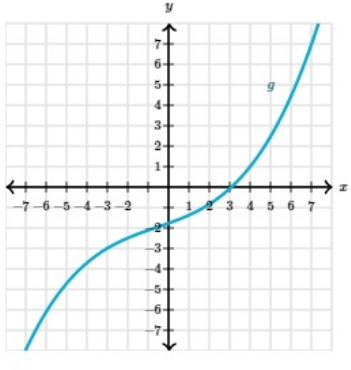


What is a reasonable estimate for $\lim_{x \to 0} h(x)$?

$\lim_{x \to 0} h(x) = 2$

Q4

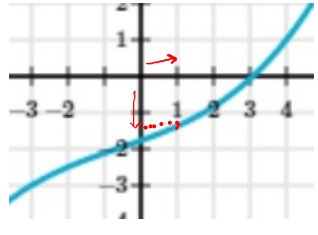
What is a reasonable estimate for $\lim_{x \to 1} g(x)$?



Choose 1 answer:

- (A) -1.9
- (B) -1.4
- (C) 1
- (D) The limit doesn't exist.

we can see that as we go closer to 1, function value go closer to -1.4 which is estimated value of f



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