1. Given:

Evaluate each limit (if it exists). If the limit doesn’t exist, explain why:

Break apart the addition.

Move the constant (5) outside.

Evaluate each limit.

Move the exponent outside.

Substitute

Move the square root outside.

Evaluate each limit.

Evaluate.

Use algebra to move the constant (3) outside fraction.

Move the constant outside.

Break the fraction apart.

Evaluate each limit.

Evaluate.

Break apart the fraction.

Evaluate each limit.

You cannot divide by zero. Does not exist!

Break apart the fraction.

Break apart the multiplication on the fraction’s numerator.

Evaluate each limit.

1. The graphs of and are given.

f(x)

g(x)

Use them to evaluate each limit (if it exists). If the limit doesn’t exist, explain why.

Break apart the addition.

Evaluate each limit.

Evaluate.

Break apart the addition.

Evaluate the limits.

does not exist because. ()

Break apart the multiplication.

Evaluate the limits.

Evaluate.

Break apart the fractions.

Evaluate the limits.

does not exist because .

Break apart the multiplication.

Move the exponent outside the limit.

Evaluate the limits.

Evaluate.

Move the square root outside the limit.

Break apart the addition.

Evaluate the limits.

Evaluate.

Evaluate each limit and tell the limit law that goes with each step:

Break apart addition and subtraction. [limit laws 1 and 2]

Move constants outside. [limit law 3]

Move exponents outside. [limit law 6]

Substitute for x. [limit law 8]

Evaluate.

Break apart multiplication. [limit law 4]

Break apart addition and subtraction. [limit laws 1 and 2]

Move constants and exponents outside. [limit laws 3 and 6]

Substitute for x. [limit law 8]

Evaluate.

Break apart fraction. [limit law 5]

Break apart addition and subtraction. [limit laws 1 and 2]

Move constants outside. [limit law 3]

Move exponents outside. [limit law 6]

Substitute for x. [limit law 8]

Evaluate.

1. (skip)
2. (skip)
3. (skip)
4. (skip)
5. Look at part A and B.
6. What is wrong with this equation:

Factor the numerator.

if and only if .

1. Knowing (A), why is this equation true:

Factor the numerator.

because you can factor inside a limit.

1. Evaluate .

Factor the numerator.

Eliminate like factors.

Evaluate.

1. (skip)
2. (skip)
3. (skip)
4. (skip)
5. (skip)
6. (skip)

FOIL the numerator’s .

Complete the cube.

Combine like terms.

Divide by .

Substitute for .

1. (skip)
2. (skip)
3. (skip)
4. (skip)
5. (skip)
6. (skip)
7. (skip)
8. (skip)
9. (skip)

Make both fractions on the numerator of the bigger fraction have a common denominator.

Subtract the fractions.

FOIL the in the numerator and combine the denominators.

Combine like terms in the numerator.

Divide an from both halves of the fraction.

Break apart the fraction. [limit law 5]

Substitute for . [limit law 8]

Evaluate.

1. Take the limit below and find its value by graphing or using a table, then check with limit laws.

Multiply both halves of the fraction by the denominator’s conjugate, .

The denominator is now in the form of .

Combine like terms.

Cancel out like factors.

Substitute for .

Evaluate.

1. (skip)
2. Prove that using the Squeeze Theorem.

Since ,

Therefore,

1. Use the squeeze theorem to show that .

Because ,

1. If , given that , find the value of .

Plug in x=4 into the inequality above and get:

Therefore, at , must equal .

1. (skip)
2. (skip)
3. (skip)
4. Find the limit of . Explain why if it doesn’t exist.

Because when , and the limit is where is approaching , .

1. (skip)
2. (skip)

Because , .

Cancel out negative signs.

Cancel out like terms.

Take the limit’s constant value.

Since we’re looking at x as if it’s to the left of 0, we say that , so .

1. Evaluate.

Since we’re looking at x as if it’s to the right of 0, we say that , so .

1. Suppose .
2. Find .

Since is approaching from the right, will always be positive, so .

Factor the numerator.

Cancel out like factors.

Substitute for . [limit law 8]

Evaluate.

1. Find .

Since is approaching from the left, will always be negative, so .

Move the negative sign to the numerator. (This is true because .)

Cancel out like factors.

Substitute for . [limit law 8]

1. Does exist?

From part (i), we found that . But in part (ii), we found that. Because has been evaluated from the left and from the right and different balues were found, does not exist.

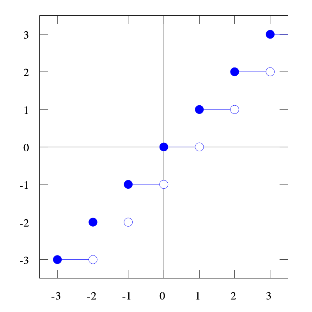
1. (skip)
2. The expression equals the integer that is closest to the left of . (Or, if is an integer, then itself). See picture to right:

Photo credit. © Omegatron.

1. Evaluate .

Look at the graph. As is approaching from the right, approaches being equal to .

1. Evaluate.

Look at the graph. As is approaching from the left, approaches being equal to . But as is approaching from the right [part a], approaches being equal to . A two-sided limit must be the same from both sides, so there isn’t a solution to this problem.

1. Evaluate.

Look at the graph. As is approaching from both the left and right, approaches being equal to .

1. Evaluate.

Look at the graph. If x is not an integer, what is ? Is it not the integer closest to the left of x? And if x is an integer? Is it not x itself?

1. Evaluate.

(skip)

1. For what values of does exist?

(skip)