

Purposes of Algorithms :

Algorithms can be used for a variety of purposes. They can be used to simplify expressions, solve equations and inequalities, and evaluate expressions. You have already used algorithms to simplify expressions and solve equations and inequalities.

Example

The following are steps to an algorithm. Determine what that algorithm is. Hint: it is a formula from your AIMS reference sheet.

- I. Add the 1st x-coordinate value to the 2nd x-coordinate value and divide by two.
- II. Add the 1st y-coordinate value to the 2nd y-coordinate value and divide by two
- III. Write your answers from step I and step II as an ordered pair.

Answer : Finding the mid - point

Logical order of conditional statements :

Conditional statements

A conditional statement is written in the form if p, then q. If a given condition is met (if p), then another condition is true or an event will happen (then q). The if-clause is the hypothesis; the then-clause is the conclusion.

Example

If tomorrow is Thanksgiving (hypothesis),
then today is Wednesday (conclusion).

If a rectangle has four equal sides (hypothesis),
Then it is a square (conclusion).

When given several related conditional statements, you must put them into logical order. Look at the hypotheses and conclusions: The conclusion of one statement will flow into the hypotheses of the next.

Example:

Put the following statements in proper logical order.

- A. If W, then X
- B. If Y, then Z
- C. IF V, then W
- D. If X, then Y

Start with any lettered statement. In this case we will start with A (If W, then X). The statement that precedes this one should end in W because this one starts with W. The statement that ends in W is C. So statement C (If V, then W) would go before statement A. Because statement C starts with V its preceding statement would end with V which does not happen so, Statement C (If V, then W) would go first, then statement A would go next (If W, then X) the next statement should start with X which is D (If X, then Y). The last statement should begin with Y which is statement B (If Y, then Z). So the order would be:

- C. If V, then W
- A. If W, then X
- D. If X, then Y
- B. If Y, then Z

Notice that the end of each statement (conclusion) is the same as the beginning of each statement (hypothesis) that follows it.

Inductive reasoning and valid conjectures :

Inductive reasoning

Inductive reasoning is the process of arriving at a conclusion based on observations or results from a limited number of cases. Such observations and results can be gathered through measurement, calculations, or the senses. A conclusion reached by inductive reasoning is called a conjecture.

Conjecture

A conjecture is never fully proven. It can be disproved by a counterexample.

Example

Write a conjecture based on the following circumstances.

- Regina has earned an A on her last five math exams and has studied hard for her sixth → Regina will get an A on her 6th math exam .
- All of Krista's siblings are very talented musicians → Krista will be a talented musician .
- That skateboarder has worked a flip into his last 11 ramp competitions → The skateboarder will put a flip in his next competition .

Identify a counterexample for a given conjecture :

Counterexample

A counterexample is an example that shows the conjecture is not true.

Example 1

Show that the conjecture below is false by providing a counterexample.

For all real numbers, the expressions x^3 is greater than x .

All you have to do for this conjecture is find one example that makes this false and then you are done.

Try a few numbers

- $2^3 = 8$ and $8 > 2$, this is true, so this is not your counterexample
- $(-2)^3 = -8$ and $-8 < 2$, this is false, so this is a counterexample