Name: ___________________________ Date: ____________________

How can the conjecture: "All teenagers like music" be supported by inductive reasoning?

Manvir listened to Frank Sinatra.

How can it be disproved?

Giovanna doesn't know who that is ☹

Inductive reasoning cannot be used to prove a conjecture true. Deductive is used to draw a specific conclusion through logical reasoning starting with general assumptions that are known to be valid.

Example Make some conclusions (deductions) given the following information:

a. Ms. Langille likes kittens. Molly is a kitten, therefore, Ms. L likes Molly.

b. Paulette lives in Medicine Hat.
Medicine Hat is in Alberta, therefore, Paulette lives in Alberta.

c. Every animal has a heart. All dogs are animals, dogs have hearts.

d. If a triangle has two equal sides, then it has two equal angles. ΔABC has two equal sides.

ΔABC has 2 equal angles (iscoseles)

Example All whole numbers are integers. 7 is a whole number, therefore: 7 is an integer

This is an example of the transitive. property.

if $a=b$ and $b=c$
then $a=c$

Example What is wrong with this example:
"~~All quarterbacks eat steak~~. Doug is the school quarterback. Thus, Doug eats steak."

this is not provable.

Proof

- ask every quarterback ever
- never ending
⇒ never proven

Theorem

- must be provable.

Assignment p. 17 #1-3
p. 22 #1, 4, 5, 11, 12 ,16

Example Jon discovered a pattern when adding consecutive numbers:

$$1+2+3+4+5=15$$
$$(-15)+(-14)+(-13)+(-12)+(-11)=-65$$

Pattern: The sum of five consecutive integers is 5 times the median. - the middle of an ordered set of #s.

a. What does this mean? Add 5 consecutive integers of your own and see if you find the same pattern. (the sum should end in a 5 or 0)

$$(-2)+(-1)+0+1+2=0$$

b. Prove the conjecture. let x = any integer

$$x+(x+1)+(x+2)+(x+3)+(x+4)$$
$$=5x+10$$
$$=5(x+2)$$

$$\frac{\cancel{5}(x+2)}{\cancel{5}}=\boxed{x+2}$$ #

Note: In this lesson we will be considering statements involving odd numbers or even numbers.

- Every even number is of the form $2n$.
- Every odd number is of the form $2n+1$.

Example When two odd numbers are added, their sums are always even.

a) Use inductive reasoning (three cases) to suggest the statement is true.

$$13+15=28$$
$$1+3=4$$

$$\begin{array}{r} 1871 \\ 933 \\ \hline 2804 \end{array}$$

b) Use deductive reasoning to prove the statement above.

let n, m be any two integers.

Then $2n+1$, $2m+1$ are 2 odd integers

$$(2n+1)+(2m+1)=2m+2n+2$$
$$=2(m+n+1)$$

Because this is divisible by 2, it is even #

Assignment p. 17 #1-3
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Example Prove the conjecture from an earlier lesson
"The difference between consecutive perfect squares is always an odd number"

let x be any integer

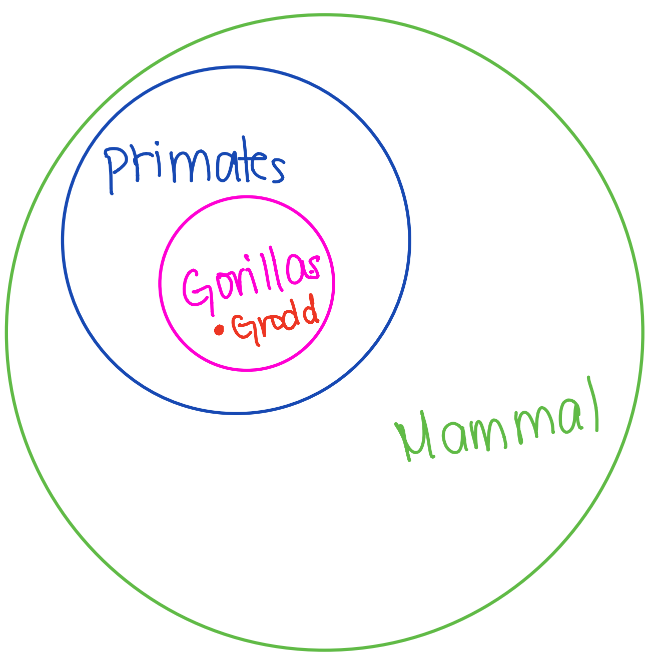
Then x^2 and $(x+1)^2$ are consecutive perfect squares.

$$(x+1)^2 - x^2$$
$$= (x+1)(x+1) - x^2$$
$$= \cancel{x^2} + 2x + 1 - \cancel{x^2}$$
$$= 2x + 1$$

which is the definition of an odd number.

Proof using Venn diagrams

Exxample Given: All gorillas are primates. All primates are mammals.
Consider: Grodd is a gorilla. What else can be deduced about Grodd?



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