1, 10, 100, 1000, 10 000, 100 000

3, -12, 48, -192, 768, -3072

0, 10, 21, 33, 46, 60, 75, 91

1, 4, 9, 16, 25, 36, 49, 64

S, M, T, W, T, F, S

1, 1, 2, 3, 5, 8, 13, 21, 34 Fibonacci

1, 3, 4, 7, 11, 18, 29, 47

1, 3, 7, 15, 31, 63, 127, 255 $a_n = 2^n - 1$

O, T, T, F, F, S, S, E, N, T, E

3, 5, 11, 29, 83, 245, 731, 2189

0, 3, 8, 15, 24, 35, 48, 63

31, 28, 31, 30, 31, 30, 31, 31, 30, 31, 30, 31

18, 46, 94, 63, 52, 61, 90, 40

0, 3, 8, 15, 24, 35, 48, 63

A, E, F, H, I, K, L, M, N, T, V

1, 4, 5, 6, 7, 9, 11, 100, 101, 104, 105, 106, 107
109, 111, 400,

6, 8, 5, 10, 3, 14, 1, 18, -1

B, 0, C, 2, D, 0, E, 3, F, 3, G, 2, H

2, 3, 6, 1, 8, 6, 8, 4, 8, 4, 8, 3, 2, 3, 2, 3, 2, 3

Deductive Logic vs. Inductive Logic

Inductive Logic
- Makes broad generalizations from specific observations
- Draws conclusions based on patterns
- Can lead to false conclusions

Deductive Logic
- Makes specific predictions based on known facts or rules
- Cannot lead to false conclusions
- 4 elements: undefined terms, definitions, theorems, postulates

A *conjecture* is an educated guess based on inductive reasoning.
To prove a conjecture wrong, a *counterexample* must be provided.

ex: For any number n, $2n > n$

$\boxed{n = -2}$ $\quad 2(-2) > -2$

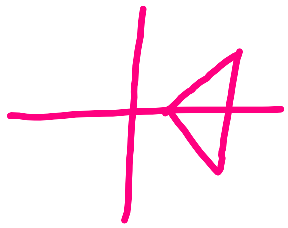
$-4 > -2$ X

counterexample

If it is a monkey, then it is an animal.

True

An image reflected across the x-axis cannot appear identical to its pre-image



<u>Statements of Logic</u>

A *Conditional Statement* is a statement written in "if-then" form

Notation: $p \rightarrow q$ p - hypothesis

q - conclusion

ex: If it is an apple, then it is a fruit.

hypothesis: it is an apple

conclusion: it is a fruit

Re-write each of the following as a conditional statement:

All triangles have three sides

If a polygon has 3 sides, then it is a Δ.

A mammal breathes oxygen

If it is a mammal, then it breathes oxygen.

To form the *Converse* of a conditional statement, interchange the hypothesis and the conclusion

Notation: $q \rightarrow p$

ex: If it is a fruit, then it is an apple.

Is this converse true? If not, provide a counterexample. No, a banana is a fruit, but it is not an apple.

** The converse of definitions are always true. However, the converse of theorems and postulates are not always true.

To form the *Inverse* of a conditional statement, negate both the hypothesis and the conclusion

Notation: $\sim p \rightarrow \sim q$

ex: If it is not an apple, then it is not a fruit.

Is this inverse true? If not, provide a counterexample. No. A banana is not an apple, but it is a fruit.

** The converse and the inverse of a conditional statement are logically equivalent (ie, they have the same "truth value")

To form the *Contrapositive* of a conditional statement, interchange the hypothesis and the conclusion, and then negate each part.

Notation: $\sim q \rightarrow \sim p$

ex: If it is not a fruit, then it is not an apple.

Is this contrapositive true? If not, provide a counterexample. True

** The contrapositive and the conditional statement are logically equivalent (ie, they have the same "truth value")

If my pet is a dog, then it is an animal.

hypothesis my pet is a dog

conclusion it is an animal

converse If it is an animal, then my pet is a dog.

inverse If my pet is not a dog, then it is not an animal.

contrapositive If my pet is not an animal, then it is not a dog.

Assignment

p. 25 # 14, 15, 17, 18, 20-27, 37, 38, 40, 44

p. 33 # 13-29, 38, 40, 41