

§1-3 Using Reasoning to find a Counterexample to a Conjecture

Learn about the Math (p18 + handout)  
 - make a conjecture about the regions for points on the circumference of a circle

(n) # of points	2	3	4	5	6
# of regions	2	4	8	16	31

# of regions  $\rightarrow 2^{n-1}$  where n is the number of pts.  
 (2<sup>1</sup>) (2<sup>2</sup>) (2<sup>3</sup>) (2<sup>4</sup>) (2<sup>5</sup>)?  
 x2 x2 x2 x2

Counterexample - an example that invalidates a conjecture

Apply the Math (p19)

Example 2 - conjectures about the difference between consecutive squares.

Steffan - difference is odd

Francesca - difference is a prime number.

$2^2 - 1^2 = 4 - 1 = 3$

$3^2 - 2^2 = 9 - 4 = 5$

$4^2 - 3^2 = 16 - 9 = 7$

$5^2 - 4^2 = 25 - 16 = 9$

} all odd  
 but not all prime.  
 ← counterexample for Francesca's conjecture.

Example 3

$1 \cdot 8 + 1 = 9$

$12 \cdot 8 + 2 = 98$

$123 \cdot 8 + 3 = 987$

$1234 \cdot 8 + 4 = 9876$

Matt thinks that the pattern will continue  
 Can you find a counterexample?

$123456789 \cdot 8 + 9 = 987654321$

$123456789(10) \cdot 8 + (10) = 98765431290$  X

$123456789(0) \cdot 8 + (10) = 9876543130$  X

We have found a counterexample, so the conjecture is only valid for digits 1 to 9

Hw

p17/1-3

1. C44 (p22)

2. p22 | 3-10, 14-17

