1.5

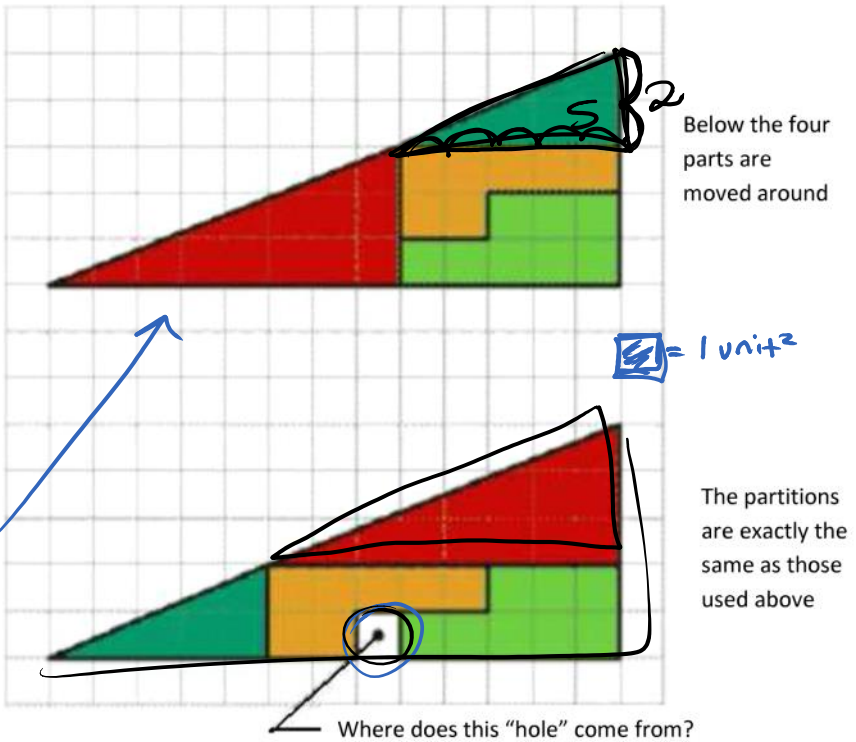
Friday, February 3, 2017 5:54 PM

FOM 11 **1.5 Proofs That Are Not Valid**

A single error in a deductive proof will make it invalid. Some common errors are:

- Dividing by zero. (error in calculation)
- Circular reasoning. (start with a false assumption)
- Confusing reasoning. (error in reasoning)

Example 1:



1) are both large triangles the same area?

- all small shapes stay the same.

(Find area of each large Δ's

Top: $\frac{b \times h}{2} = 13 \times 5 \div 2$

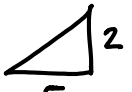
$= 32.5$

Bottom: $\frac{b \times h}{2} - 1$

$= \frac{13 \times 5}{2} - 1 = 31.5$

↳ how is this possible? (made of same shapes, but different areas.)

2) Find the slopes of the small Δ's.

slope $= \frac{2}{5}$  slope $= \frac{3}{8}$

⇒ the slopes are not the same.

We made a false assumption that the large shapes were triangles.

Example 2:

Why is this proof invalid?

Given: $a = b$

$a^2 = a \cdot a$ ↗ $a = b$ ↘ $a^2 = ab$

$a^2 = ab$ ✓

$a^2 - b^2 = ab - b^2$ subtract b^2 from both sides ✓

$(a+b)(a-b) = b(a-b)$ factor ✓

$(a+b) = b$ ✗ ← divide by $(a-b)$ but since $a = b$ $(a-b) = 0$ You cannot divide by zero.

$a+a = a$

$2a = a$

$2 = 1$!!!

∴ error in calculation

Example 3: Isaac claims that $-3 = 3$.

Proof: Assume $-3 = 3$. ← false assumption (we know $-3 \neq 3$)

$(-3)^2 = 3^2$

$9 = 9$

Therefore: $-3 = 3$.

Where did Isaac go wrong?

also circular reasoning ⇒ you cannot assume the thing you are trying to prove.

Assignment: pg. 42 #1, 3, 5, 6, 7, 10