

Topic 1-8 Proof by Contradiction

(also see examples in GREEN Text Book)

~~Direct~~ Indirect Proof (Proof by Contradiction)

Geometry Notes

Example 1: STATING CONCLUSIONS

State the assumption you would need to make to start an indirect proof of each statement. (i.e., do procedure steps 1 & 2)

A) Prove: $m\angle ABC = m\angle DBG$

∴ 1) **Either** $m\angle ABC = m\angle DBG$ or $m\angle ABC \neq m\angle DBG$

EX: 2) **Assume** $m\angle ABC \neq m\angle DBG$ assume the opposite is true.

B) Prove: $\overline{AB} \perp \overline{FG}$

1) **Either** $\overline{AB} \perp \overline{FG}$ or $\overline{AB} \not\perp \overline{FG}$

2) **Assume** $\overline{AB} \not\perp \overline{FG}$

C) Prove: $m\angle 1 = 58^\circ$

1) **Either** $m\angle 1 = 58^\circ$ or $m\angle 1 \neq 58^\circ$

2) **Assume** $m\angle 1 \neq 58^\circ$

D) Prove: $\triangle ABC$ is a right triangle

1) **Either** $\triangle ABC$ is a $\text{Rt}\triangle$, or $\triangle ABC$ is not a $\text{Rt}\triangle$

2) **Assume** $\triangle ABC$ is not a right triangle

CAUTION!!!
Never negate the GIVENS!

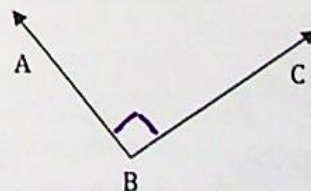
- Indirect Proof Procedure:
1. List all of the possibilities for the conclusion (either/or)
 2. Assume the *negation* of the conclusion is correct
 3. Write a chain of reasoning until you reach an impossibility
 - A. Contradiction of given information
 - B. Contradiction of theorem, definition or other known fact
 4. State the remaining possibility as the desired conclusion.

Example 2:

Given: $\angle ABC$ is not a right angle

You will end up contradicting THIS!

Prove: $m\angle ABC \neq 90$



Begin Here!

Step 1: Either $m\angle ABC \neq 90$ or $m\angle ABC = 90$

Step 2: Assume $m\angle ABC = 90$ (treat your assumption like a "given" now)

Step 3: If $m\angle ABC = 90$, then $\angle ABC$ is a right angle because all right angles measure 90° . However, this **contradicts the given** that $\triangle ABC$ is not a right angle.

Step 4: ∴ Therefore, $m\angle ABC \neq 90$