

Logic Examples

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Credit: Most examples from Epp, *Discrete Mathematics with Applications*, 4th ed.

Negations

Negate:

- ▶ Hal is a math major and Amy is a computer science major.
- ▶ Sam is an orange belt and Kate is a red belt.
- ▶ The units digit of 4^{67} is 4 or it is 6.
- ▶ The train is late or my watch is fast.
- ▶ If P is a square, then P is a rectangle.
- ▶ If n is prime, then n is odd or n is 2.

“More fun” examples:

- ▶ If the Gamecocks practice hard and they improve their running game, then they will beat Clemson and they will win the SEC.
- ▶ If you earn an A in Math 300, or if you earn a B in Math 300 and an A in Math 544, then if you take Math 374 you will find it easy but you probably won't want to take it.

Conditional statements

“If iron is melting, then its temperature must be at least 2800 degrees.” Assuming this, which of these must be true?

- ▶ If iron is at least 2800 degrees, then it is melting.
- ▶ If iron is less than 2800 degrees, then it is not melting.
- ▶ Iron will melt only if its temperature is at least 2800.
- ▶ If iron is not melting, then its temperature is less than 2800.
- ▶ A necessary condition for iron to melt is that its temperature be at least 2800.
- ▶ A sufficient condition for iron to melt is that its temperature be at least 2800.