

3. If  $P$  is false, then  $P \wedge Q$  is false. If the original statement is true, then both sides of  $\iff$  must be equal, i.e.  $(R \implies S)$  must be false too. For an implication to be false, then

$$R = \text{true}$$

$$S = \text{false}$$

It's impossible to know what  $Q$  is as  $P$  is false and  $P \wedge Q$  will always be false regardless of  $Q$ 's value.