**Section 1.10, 1.11, and 2.1**

**Part One**

For each of the following pair of propositional statements, indicate whether you can conclude:

* p
* q
* ¬ p
* ¬ q
* No conclusion can be made
* **There is an error** in the pair of propositional statements

|  |  |  |  |
| --- | --- | --- | --- |
|  | Suppose that you know this and … | this | What new thing can you conclude? |
| 1 | p ∧ q | p |  |
| 2 | p ∨ q | p |  |
| 3 | p → q | p |  |
| 4 | p ∧ q | ¬ p |  |
| 5 | p ∨ q | ¬ p |  |
| 6 | p → q | ¬ p |  |
| 7 | p → q | q |  |
| 8 | p → q | ¬ q |  |

**Part Two**

For each exercise, decide what conclusion, if any, can be reached from the given hypotheses. Defend WHY.

1. If the car was involved in the hit-and-run, then the paint would be chipped. But the paint is not chipped.
2. Either the weather will turn bad or we will leave on time. If the weather turns bad, then the flight will be cancelled.
3. If the bill was sent today, then you will be paid tomorrow. You will be paid tomorrow.
4. The grass needs mowing and the trees need trimming. If the grass needs mowing then we need to rake the leaves.

**Part Three**

Define the following vocabulary words.

* theorem
* proof
* axioms
* proof by exhaustion
* counter example

**Part Four**

For each of the following theorems either prove by direct proof or disprove by counterexample

1. There is a perfect square that can be written as the sum of two other perfect squares.
2. There is an integer n such that 2n2 – 5n + 2 is prime.
3. For all real numbers a and b, if a<b then a2 < b2
4. For all integers n, if n is odd then (n-1)/2 is odd.
5. For all integers m and n, if 2m + n is odd then m and n are both odd.