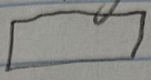10/6/23 　　　　　 Quiz 2 　　　　　　 Josiah Schmitz

1. I. There is a geometric figure that is both a rectangle and a square. True; a square is also a rectangle. II. There is a geometric figure that is a rectangle but not a square. True; [rectangle] ← this is a rectangle but not a square. III. All squares are rectangles. True; by definition, a square is a rectangle with equal sides.

2. 12 divides 709,438 = p; 3 divides 709,438 = q; Sum of digits of 709,438 is divisible by 9 = r

p	q	r	p → q	r → q	∨r	∨p	The argument is valid
T	T	T	T	T	F	F	because the conclusion
T	T	F	T	T	T	F	is true when all the
T	F	T	F	F	F	F	premises are true.
T	F	F	F	T	T	F	
F	T	T	T	T	F	T	
F	T	F	T	T	T	T	
F	F	T	T	F	F	T	
F	F	F	T	T	T	T	

3. p ⇒ q 　　Valid, because it follows the modus tollens
   　~q 　　　　form of argument.
   ∴ ~p

4. I. S = 1 　　II. ~(P ∧ Q) ∧ (Q ∨ R)

5. I. ∀ square of odd integer n, n is odd.
   II. ∀n, if n is the square of an odd integer, then n is odd
   III. ∀n, if n is not the square of an odd integer, then n is not odd

6. ∀ rational numbers x, ∃ x such that x can be written as a ratio of some integers.

7. P ————[AND]———[AND]—
    Q ————
    R ————
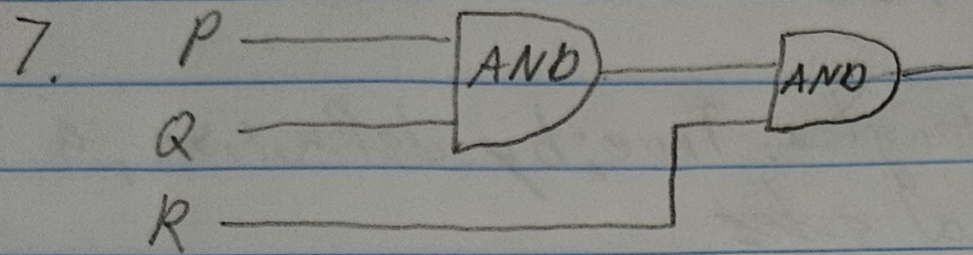
8. For A, x = 4, 10, 16. For B, y = 2, 20, 38. A and B do not share elements so A ⊆ B is false and B ⊆ A is false. For C, z = 16, 34, 52. B and C do not share elements, so B = C is false.