

Midterm 1 Samples (Answers)

Sample 1

1. Not equivalent, e.g. take $p \equiv T, q \equiv F, r \equiv F$.
2. True, False, False
3. Consider two cases $x \geq 3$ and $x \leq 2$ to get $x = 2$ and $y = 1$ as the unique solution.
4. (a) $\forall A \forall B (\neg F(A) \wedge F(B)) \rightarrow \neg S(A, B)$ (b) $\forall A F(A) \rightarrow S(\emptyset, A)$
5. Different proofs are possible.
6. Many examples are possible. One example is following this pattern: $f(1) = 0, f(2) = 1, f(3) = -1, f(4) = 2, f(5) = -2, \dots$ Can you turn this into a formula? $f(n) = ?$

Sample 2

1. It is not. Give a counterexample.
2. True, True, False
3. Different proofs are possible.
4. (a) No student in my class uses e-mail. (b) xy is irrational and x and y are both rational.
5. Not one-to-one (give an example). Not onto (give an example).
6. $\emptyset$ and $(1, \infty)$.
7. True, False