Name: _____

(Practice) Exam

1. (10 points) State the law of contraposition and (one of) DeMorgan's laws and prove them using a truth table.

2. (10 points) Determine the truth values of the following statements if the domain consists of all real numbers, **along with a brief justification of your answer**

    1. $\forall x\ 2x > 0$

    2. $\exists x\ 2x > 0$

    3. $\forall x\ 2x^2 > x^2$

3. (15 points) Determine the truth values of the following statements if the domain consists of all real numbers, **along with a brief justification of your answer**

   1. $\forall x \forall y\ x > y$

   2. $\forall x \exists y\ x > y$

   3. $\exists x \forall y\ x > y$

   4. $\exists x \exists y\ x > y$

4. (15 points) Make up a conditional statement, and give examples of converse error, and inverse error applied to your conditional.

   For class discussion today, use the conditional I came up with: *If Patrick wins Super Bowl MVP, then KC won the Super Bowl*

5. (10 points) Consider the argument:
   Quincy likes all action movies. Quincy likes the movie Eight Men Out. Therefore, Eight Men Out is an action movie.

Explain whether the argument is logically valid or invalid, using some of the logic terms we have discussed (not all of these will be needed): *modus ponens, modus tollens, conditional, converse, inverse, affirming the conclusion, denying the hypothesis*

6. (10 points) Prove that the _____ (pick one: sum/product/difference) of an _____ integer (pick one: even/odd) and an _____ (pick one: even/odd) integer is an _____ (pick the CORRECT one: even/odd) integer.

7. (30 points) Prove the following statement via the three types of proofs we have discussed (direct proof, proof by contraposition, proof by contradiction): *If n is even, then $n + 4$ is even*