

Name: _____

NetID: _____ Lecture: A B

Discussion: Thursday Friday 9 10 11 12 1 2 3 4 5 6

1. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every dragon d , if d is green, then d is not large or d is fat.

2. (5 points) State the negation of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For any student s , if s rides a bicycle, then s wears a helmet or s has no fear of death.

3. (5 points) Solve $\frac{3}{x} + m = \frac{3}{p}$ for x , expressing your answer as a single fraction. Simplify your answer and show your work.

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1. (5 points) Give a truth table for the following expression and (using your truth table or other means) find a simpler expression equivalent to it.

$$(p \wedge q) \vee q \equiv$$

p	q	$p \wedge q$	$(p \wedge q) \vee q$
T	T		
T	F		
F	T		
F	F		

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every cat c , if c is not fierce or c wears a collar, then c is a pet.

3. (5 points) Solve $16p^2 - 81 = 0$ for p . Simplify your answer and show your work.

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1. (5 points) State the negation of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every dragon d , if d is not large, then d is green or d not hungry.

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every tree t , if t is in Illinois and t is not hardy, then t is indoors.

3. (5 points) Suppose that k is a positive integer, x is a positive real number, and $\frac{1}{k} = x + \frac{1}{6}$. What are the possible values for k ? (Hint: k is an INTEGER.) Briefly explain or show work.

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1. (5 points) Show that the following two expressions are not logically equivalent, by giving specific values of p, q for which they produce different values.

$$p \rightarrow (q \rightarrow p)$$

$$(p \rightarrow q) \rightarrow p$$

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every car c , if c is a Tesla, then c is new or c is not fast.

3. (5 points) Suppose that k is a positive integer, x is a positive real number, and $\frac{1}{k} + x = \frac{1}{6}$. What are the possible values for k ? (Hint: k is an INTEGER.) Briefly explain or show work.

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1. (5 points) State the negation of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every tree t , if t grows in Canada, then t is not tall or t is a conifer.

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every garbage can c , if c was supplied by the city, then c is small or c has wheels.

3. (5 points) Solve $3x + 2m = \frac{w}{y}$ for x , expressing your answer as a single fraction. Simplify your answer and show your work.

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1. (5 points) Give a truth table for the following expression and (using your truth table or other means) find a simpler expression equivalent to it.

$$(p \rightarrow q) \wedge (p \rightarrow \neg q) \equiv$$

p	q	$p \rightarrow q$	$p \rightarrow \neg q$	$(p \rightarrow q) \wedge (p \rightarrow \neg q)$
T	T			
T	F			
F	T			
F	F			

2. (5 points) State the negation of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every book b , if b is blue or b is not heavy, then b is not a math book.

3. (5 points) Solve $\frac{2m^2 - m - 6}{m - 2} = 9$ for m . (Assume $m \neq 2$.)

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1. (5 points) State the negation of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

There is a soup s such that s is tasty and s does not contain meat.

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For any bear b , if b is blue and b talks, then b is fuzzy.

3. (5 points) Suppose that G and H are functions whose inputs and outputs are real numbers, defined by $G(x) = x - 2$ and $H(x) = \sqrt{2x + 1}$, where the square root function returns only the positive root. Compute the value of $H(G(G(8)))$, showing your work.

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1. (5 points) Show that the following two expressions are not logically equivalent, by giving specific values of p , q , and r for which they produce different values.

$$(p \rightarrow q) \wedge r$$

$$p \rightarrow (q \wedge r)$$

2. (5 points) State the contrapositive of the following claim, moving all negations (e.g. “not”) so that they are on individual predicates.

For every jedi j , if j has a light saber and j is not sick, then j can defeat the Dark Side.

3. (5 points) Suppose that x is an integer and $x^2 + 3x - 18 < 0$. What are the possible values of x ? Show your work.