Math 22 (9:30am - 10:20am) Pop Quiz 2 Version T Tue Oct 4, 2011

SCORE: ____ / 6 POINTS

Suppose *x* is a particular real number. Let p = "x < 3". Let q = "0 < x". Let r = "x = 3". Write the logical form for " $0 < x \le 3$ " using *p*, *q* and/or *r*.

 $q \wedge (p \vee r)$

Suppose *x* is a particular real number.

Use DeMorgan's laws to write the negation of the statement " $-2 < x \le 5$ ".

" $-2 < x \le 5$ " " $-2 < x \text{ and } x \le 5$ " is equivalent to So, the negation of " $-2 < x \le 5$ " is equivalent to the negation of "-2 < x and $x \le 5$ ", is equivalent to the negation of "-2 < x" or the negation of " $x \le 5$ ", which by DeMorgan's laws, which is " $-2 \ge x$ or x > 5"

Construct a truth table for $q \lor \sim (p \land \sim q)$. If you wish, you may use the logical equivalences in Theorem 2.1.1 of your textbook to simplify the expression first.

р	q	~q	$p \wedge \sim q$	$\sim (p \land \sim q)$	$q \lor \sim (p \land \sim q)$
Т	Т	F	F	Т	Т
Т	F	Т	Т	F	F
F	Т	F	F	Т	Т
F	F	Т	F	Т	Т

$q \lor \sim (p \land \sim q)$	=	$q \lor (\sim p \lor \sim (\sim q))$	DeMorgan's Law
	≡	$q \lor (\sim p \lor q)$	Double Negative Law
	=	$q \lor (q \lor \sim p)$	Commutative Law
	=	$(q \lor q) \lor \sim p$	Associative Law
	=	$q \vee \sim p$	Idempotent Law
	=	$\sim p \lor q$	Commutative Law
	=	$p \rightarrow q$	not from Theorem 2.1.1

SCORE: / 1 POINT

SCORE: / 2 POINT

SCORE: ____/ 3 POINTS

Math 22 (9:30am – 10:20am) Pop Quiz 2 Version O Tue Oct 4, 2011

SCORE: ____ / 6 POINTS

Suppose x is a particular real number. Let p = "x = 3". Let q = "x < 3". Let r = "0 < x". Write the logical form for " $0 < x \le 3$ " using p, q and/or r.

 $r \wedge (q \vee p)$

Suppose *x* is a particular real number.

Use DeMorgan's laws to write the negation of the statement " $-3 < x \le 1$ ".

"-3 < $x \le 1$ "is equivalent to"-3 < x and $x \le 1$ "So, the negation of"-3 < $x \le 1$ "is equivalent tothe negation of"-3 < x and $x \le 1$ ",which by DeMorgan's laws,is equivalent tothe negation of "-3 < x" or the negation of " $x \le 1$ ",which is " $-3 \ge x$ or x > 1"

Construct a truth table for $p \lor \sim (q \land \sim p)$. **SCORE:** / **3 POINTS If you wish**, you may use the logical equivalences in Theorem 2.1.1 of your textbook to simplify the expression first.

р	q	~ <i>p</i>	$q \wedge \sim p$	$\sim (q \wedge \sim p)$	$p \lor \sim (q \land \sim p)$
Т	Т	F	F	Т	Т
Т	F	F	F	Т	Т
F	Т	Т	Т	F	F
F	F	Т	F	Т	Т

$p \lor \sim (q \land \sim p)$	=	$p \lor (\sim q \lor \sim (\sim p))$	DeMorgan's Law
	=	$p \lor (\sim q \lor p)$	Double Negative Law
	=	$p \lor (p \lor \neg q)$	Commutative Law
	=	$(p \lor p) \lor \sim q$	Associative Law
	=	$p \lor \sim q$	Idempotent Law
	=	$\sim q \vee p$	Commutative Law
	=	$q \rightarrow p$	not from Theorem 2.1.1

SCORE: ____/ 1 POINT

SCORE: / 2 POINT

< 1"

Math 22 (9:30am – 10:20am) Pop Quiz 2 Version F Tue Oct 4, 2011

Suppose *x* is a particular real number. Let p = "x < 3". Let q = "x = 3". Let r = "0 < x". Write the logical form for " $0 < x \le 3$ " using *p*, *q* and/or *r*.

 $r \wedge (p \vee q)$

Suppose *x* is a particular real number.

Use DeMorgan's laws to write the negation of the statement " $-1 < x \le 3$ ".

" $-1 < x \le 3$ " " $-1 < x \text{ and } x \le 3$ " is equivalent to So, the negation of " $-1 < x \le 3$ " is equivalent to the negation of "-1 < x and $x \le 3$ ", is equivalent to the negation of "-1 < x" or the negation of " $x \le 3$ ", which by DeMorgan's laws, which is " $-1 \ge x \text{ or } x > 3$ "

Construct a truth table for $q \land \sim (p \lor \sim q)$. If you wish, you may use the logical equivalences in Theorem 2.1.1 of your textbook to simplify the expression first.

р	q	~q	$p \lor \sim q$	$\sim (p \lor \sim q)$	$q \wedge \sim (p \vee \sim q)$
Т	Т	F	Т	F	F
Т	F	Т	Т	F	F
F	Т	F	F	Т	Т
F	F	Т	Т	F	F

$q \wedge \sim (p \vee \sim q)$	=	$q \wedge (\sim p \wedge \sim (\sim q))$	DeMorgan's Law
	=	$q \wedge (\sim p \wedge q)$	Double Negative Law
	=	$q \wedge (q \wedge \sim p)$	Commutative Law
	=	$(q \wedge q) \wedge \sim p$	Associative Law
	=	$q \wedge \sim p$	Idempotent Law

SCORE: / 1 POINT

SCORE: / 2 POINT

SCORE: ____/ 3 POINTS

Math 22 (9:30am - 10:20am) Pop Quiz 2 Version U Tue Oct 4, 2011

Suppose *x* is a particular real number. Let p = "x = 3". Let q = "0 < x". Let r = "x < 3". Write the logical form for " $0 < x \le 3$ " using *p*, *q* and/or *r*.

 $q \wedge (r \vee p)$

Suppose *x* is a particular real number.

Use DeMorgan's laws to write the negation of the statement " $-5 < x \le 2$ ".

	"-5 < $x \le 2$ "	is equivalent to		"-5 < x and $x \le 2$ "
So, the negation of	"-5 < $x \le 2$ "	is equivalent to	the negation of	"-5 < x and $x \le 2$ ",
which by DeMorgan's laws,		is equivalent to	the negation of "	$-5 < x$ " or the negation of " $x \le 2$ ",
which is " $-5 \ge x \text{ or } x > 2$	"			

Construct a truth table for $p \land \neg (q \lor \neg p)$. SCORE: ____ / 3 POINTS If you wish, you may use the logical equivalences in Theorem 2.1.1 of your textbook to simplify the expression first.

р	q	~ p	$q \lor \sim p$	$\sim (q \vee \sim p)$	$p \wedge \sim (q \vee \sim p)$
Т	Т	F	Т	F	F
Т	F	F	F	Т	Т
F	Т	Т	Т	F	F
F	F	Т	Т	F	F

$p \wedge \sim (q \vee \sim p)$	=	$p \wedge (\sim q \wedge \sim (\sim p))$	DeMorgan's Law
	=	$p \wedge (\sim q \wedge p)$	Double Negative Law
	=	$p \wedge (p \wedge \neg q)$	Commutative Law
	=	$(p \land p) \land \neg q$	Associative Law
	=	$p \wedge \neg q$	Idempotent Law

SCORE: / 1 POINT

SCORE: ____ / 2 POINT