CS 278 Lab 3

1.5.3 (d) $\neg(p \to q) \to \neg q$

$\neg(\neg p \vee q) \to \neg q$	conditional
$(p \wedge \neg q) \to \neg q$	deMorgans
$\neg(p \wedge \neg q) \vee \neg q$	conditional
$\neg p \vee q \vee \neg q$	deMorgan
$\neg p \vee T$	Complement
T	Domination

(e) $\neg p \to (p \to q)$

$\neg p \to \neg p \vee q$	Conditional
$\neg\neg p \vee (\neg p \vee q)$	Conditional
$p \vee (\neg p \vee q)$	Double negation
$(p \vee \neg p) \vee q$	Associative
$T \vee q$	Complement
T	Domination

1.6.1 (b) $\neg P(3)$ proposition

$\neg$ 3 is even $\neg$ False True

(d) $T(5, x)$ predicate

(g) $P(3) \vee T(5, 32)$ proposition

3 is even or $z^5 = 32$

false or true

True

1.6.2 (b) $\exists x (x + 2 = 1)$ domain: all integers

True; $\exists(-3)$ $-3 + 2 = 1$ ✓

(d) $\forall x (x^2 - x \neq 0)$

False $\forall(1)$ $1^2 - 1 = 0$ ✓

(f) $\exists x (x^2 > 0)$

True $\exists(2)$ $2^2 > 0$ ✓

1.6.3 (b) The square of every number is at least 0

$\forall x (x^2 \geq 0)$

(c) There is a number equal to its square

$\exists x (x = x^2)$

1.6.4 (b) $\exists x P(x)$

True $P(a), P(b), P(c), P(d) = T$

(d) $\exists x Q(x)$ $Q(a) = T$

True

(f) $\exists x R(x)$ $R(a, b, c, d) = F$

False

1.6.5 (b) $\exists x P(x)$ domain: 1, 2, 3, 4

$P(1) \vee P(2) \vee P(3) \vee P(4)$