Quiz Section 0: Introduction

Task 1 – Warm Up [10 pts]

Translate these English statements into propositional logic, making the atomic propositions as simple as possible and exposing as much of the logic via symbols as possible.

a) "If I am lifting weights this afternoon, then I do a warm-up exercise."

b) "I can go home only if I have finished my homework."

Task 2 – More translations [15 pts]

Translate these English statements into propositional logic, making the atomic propositions as simple as possible and exposing as much of the logic via symbols as possible.

a) "If a red apple falls on my head and I come up with the concept of gravity, then I am Isaac Newton."

b) "If I find an apple on my doorstep, then I will be very happy, but I will not dance. But if I find an orange on my doorstep, then I will be very happy and I will dance."

c) "If it is the case that whenever I find lemons, I make lemonade, then it is also the case that whenever I find green apples, I make apple juice."

Task 3 – English translations [10 pts]

Translate these propositional logic statements back into English. The atomic propositional logic variables are defined as follows:
a: The cat sees the mouse.
b: The mouse sees the cat.
c: The cat catches the mouse.
d: The mouse is scared.
e: The cat chases the mouse.
f: The mouse stands still.

a) $(a \wedge \neg b) \rightarrow (\neg d \wedge c)$

b) $(a \wedge b) \rightarrow (((f \rightarrow (d \wedge c)) \wedge (\neg f \rightarrow (e \wedge \neg c)))$

Task 4 – Canonical Forms [10 pts]

Consider the boolean functions $F(A, B, C)$ and $G(A, B, C)$ specified by the following truth table:

A	B	C	$F(A,B,C)$	$G(A,B,C)$
T	T	T	T	F
T	T	F	T	T
T	F	T	F	F
T	F	F	F	F
F	T	T	T	T
F	T	F	T	F
F	F	T	F	T
F	F	F	T	F

a) Write the DNF and CNF expressions for $F(A, B, C)$.

b) Write the DNF and CNF expressions for $G(A, B, C)$.

Task 5 – Circuits [5 pts]

Translate the following circuit into a logical expression.