Quiz 20201006 Solution

Name: **School ID:**

1. **(5%)** Show that $[\neg p \wedge (p \vee q)] \rightarrow q$ is a tautology.

Solution:

Truth table:

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

2. **(5%)** Write down the negation of the statement "In every mathematics class there is some student who falls asleep during lectures."

Solution 1: There is a mathematics class in which no student falls asleep during lectures.

Solution 2: It is not the case that in every mathematics class there is some student who falls asleep during lectures.

3. **(5%)** Explain whether the following system specifications are consistent.

- Whenever the system software is being upgraded, users cannot access the file system.
- Users can save new files if they can access the file system.
- If users cannot save new files, then the system software is not being upgraded.

Solution:

Let p be "the system software is being upgraded", q be "users can access the file system", r be "users can save new files". Then the specifications are represented by $(p \rightarrow \neg q) \wedge (q \rightarrow r) \wedge (\neg r \rightarrow \neg p)$. By setting $p = T$, $q = F$ and $r = T$, the specs are consistent.