

CPSC 121,
2007/8 Winter Term 2
Sample Quiz 2

Name: _____

Student ID: _____

Signature: _____

- Justify all of your answers.
- No notes or electronic equipment are allowed.
- Keep your answers short. If you run out of space for a question, you have written too much.
- The number in square brackets to the left of the question number indicates the number of marks allocated to that question.
- Good luck!

UNIVERSITY REGULATIONS:

- Each candidate should be prepared to produce, upon request, his/her university-issued ID.
- No candidate shall be permitted to enter the examination room after the expiration of one half hour or to leave during the first half hour of the examination.
- CAUTION: candidates guilty of any of the following, or similar, dishonest practices shall be immediately dismissed from the examination and shall be liable to disciplinary action.
 1. Having at the place of writing, or making use of, any books, papers or memoranda, electronic equipment, or other memory aid or communication devices, other than those authorised by the examiners.
 2. Speaking or communicating with other candidates.
 3. Purposely exposing written papers to the view of other candidates. The plea of accident or forgetfulness shall not be received.
- Candidates must not destroy or mutilate any examination material; must hand in all examination papers; and must not take any examination material from the examination room without permission of the invigilator.

1. Prove that adding a disjunct to the conclusion of a valid argument can never invalidate the argument.

Reminder: a disjunct is one of the logical values connected by a disjunction operator, so in the proposition $\mathbf{p} \vee \mathbf{q}$, both \mathbf{p} and \mathbf{q} are disjuncts. So, if the original conclusion of the argument was $(\mathbf{s} \wedge \mathbf{r})$, an example of adding a disjunct would be $((\mathbf{s} \wedge \mathbf{r}) \vee \mathbf{t})$.

2. We will use the predicates and domains from the BC STV question on assignment 2.

$R(v, x, y)$: voter v ranked candidate x over candidate y

C is the set of all candidates, $C = \{\text{Mei}, \text{Peng}, \text{Qi}\}$

V is the set of all voters, $V = \{\text{Abra}, \text{Basil}, \text{Cala}\}$

And, we will introduce a new predicate

$E(x)$: x was elected

a) Translate from predicate logic to English

$$\forall x \in C, \forall y \in C, (\forall v \in V, R(v, x, y)) \rightarrow (E(y) \rightarrow E(x))$$

b) Translate the following English sentence to predicate logic

Exactly three voters ranked Peng first.

(Warning: this is a **very** tricky problem. We would probably ask something easier on the quiz. As a hint to get started: try saying “at least three voters ranked Peng first AND at most three voters ranked Peng first”.)

3. Prove that every real number is either an integer or between some integer x , and $x + 1$.