**COMP 681 Formal Methods Spring 2008 Recitation 4**

**1**. Consider the following conditional. Note that the conditions of the conditionals within the {…} are mutually exclusive.

```
if P and Q then  {
  if R the S1
  else S2
}
else if T then  {
   if Q then S1
   else S2
}
else S2
```

**a**. In the language of propositional logic, write the conditions under which each of the statements $S_1$ and $S_2$ is executed. Simplify, at least move all ¬'s inward so they apply only to primes and factor out common terms.

**b**. Rewrite the conditional in the form

```
if _ then  {
  if _ then  {
    if _ then __
    else __
  }
  else  {
    if _ then __
    else __
}
else __
```

**2**. A group of experts from different departments decides that procedure $S_1$ is done when $P$ is true, that $S_2$ is done if $R$ is false, and that $S_3$ is done both $Q$ and $R$ hold.

**a**. Write a GCL alternation statement that captures these requirements. (The conditions won't be mutually exclusive at this point.)

**b**. You point out to the experts that their conditions are not mutually exclusive. They decide among themselves that $S_1$ should take priority over the other two statements and that $S_3$ should take priority over $S_2$. Rewrite the conditions so that they are mutually exclusive and respect these priorities.

**c**. For the cases not covered in **b**, add another alternative whose guard covers the remaining cases yet is disjoint from each of the other three guards. The command associated with this guard should be `skip`.

**d**. Translate the alternative statement in c into the language used in section 3.3 Minimize the number of primes that must be evaluated.