

1. Consider the following conditional. Note that the conditions of the conditionals within the $\{\dots\}$ are mutually exclusive.

```

if  $P$  and  $Q$  then {
  if  $R$  then  $S_1$ 
  else  $S_2$ 
}
else if  $T$  then {
  if  $Q$  then  $S_1$ 
  else  $S_2$ 
}
else  $S_2$ 

```

- 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 \neg '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 and Q is false, that S_2 is done if R is false, and that S_3 is done when P holds.
- 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_2 should take priority over the other two statements and that S_1 should take priority over S_3 . 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.