Programming theory - problems sheet - 3

1. Over any arbitrary statespace A, find all the problems that can be solved by program $ABORT$.

2. Let A be any arbitrary statespace, and let $S_1, S_2 \subseteq A \times (\bar{A} \cup \{fail\})^{**}$ be programs, such that $S_1 \subseteq S_2$ holds.
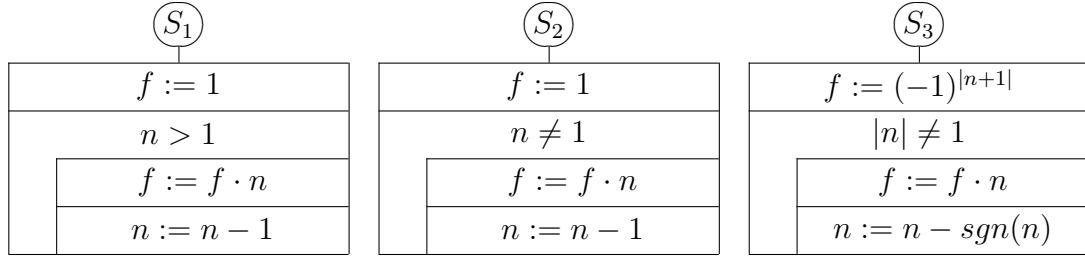
   (a) Is $D_{p(S_1)} \subseteq D_{p(S_2)}$ true?

   (b) Is $D_{p(S_2)} \subseteq D_{p(S_1)}$ true?

3. $A = (n:\mathbb{Z}, f:\mathbb{Z})$
   Problem F is given as follows: $F = \{(a, b) \in A \times A \mid n(a) > 0 \land f(b) = n(a)!\}$

   (a) Are the three given programs equivalent?

   (b) Determine the programfunction of the given three programs.

   (c) Does any of the given programs solve the problem?

S_1
$f := 1$
$n > 1$
$f := f \cdot n$
$n := n - 1$

S_2
$f := 1$
$n \neq 1$
$f := f \cdot n$
$n := n - 1$

S_3
$f := (-1)^{|n+1|}$
$|n| \neq 1$
$f := f \cdot n$
$n := n - sgn(n)$

4. Let A be any arbitrary statespace. Let $S_1 \subseteq A \times (\bar{A} \cup \{fail\})^{**}$ be a program, and let $F \subseteq A \times A$ be a problem, such that S_1 solves F. Let $S_2 \subseteq S_1$ be a relation, such that S_2 is a program. Prove that program S_2 also solves F.