

# Homework #1

**Due:** January 19, 2022

**Points:** 100

## Questions

1. (16 points) Consider the following change in the rules associated with each (object, verb) pair in Miller and Baldwin's model (see Section 2.2.1):

<i>name</i>	<i>rules</i>
recipes	write: 'creative' in subject.group and 'chef' in subject.role
overpass	write: 'artist' in subject.role and 'creative' in subject.group
.shellrct	write: 'hack' in subject.group and (time.hour < 4 or time.hour > 20) and time.hour > 0
oven.dev	temp_ctl: 'kitchen' in subject.program and 'chef' in subject.role

How does this change the access control matrices shown at the end of that section?

2. (24 points) Consider the set of rights  $\{r, w, n\}$ .
- Using the syntax in Section 2.3, write a command  $delete\_all\_rights(p, q, o)$ . This command causes  $p$  to delete all rights the subject  $q$  has over an object  $o$ .
  - Modify your command so that the deletion can occur only if  $p$  has  $w$  rights over  $o$ .
  - Modify your command so that the deletion can occur only if  $p$  has  $r$  rights over  $o$  and  $q$  does *not* have  $n$  rights over  $o$ .
3. (30 points) Theorem 3.1, used in the proof of Theorem 3.1, states: "Suppose two subjects  $s_1$  and  $s_2$  are created and the rights in  $A[s_1, o_1]$  and  $A[s_2, o_2]$  are tested. The same test for  $A[s_1, o_1]$  and  $A[s_1, o_2] = A[s_1, o_2] \cup A[s_2, o_2]$  will produce the same result." Justify this statement. Would it be true if one could test for the absence of rights as well as for the presence of rights?
4. (20 points) Prove or disprove: The claim of Lemma 3.1 holds when  $x$  is an object.
5. (10 points) In the SPM model, acyclic creates impose constraints on the types of created subjects but not on the types of created objects. Why not?