# Exercises for week 8

1. Consider the following program

```
1: int a;
2: int b;
3:
4: int main()
5: {
6:   a=256;
7:   gpr(1) = a;
8:   gpr(2) = b& {1};
9:
10:  asm(
11:    srl  1 1 4
12:    sw   1 2 0
13:  );
14:
15:  return 1
16:}
```

   Let $(d, c)$ be the configuration after the assembly portion.

   (a) Show (20 points)

   $$va(b, c) = 16.$$

   (b) Change the assignment at line 8 to

   ```
   gpr(2) = b&
   ```

   Can you still show (a)? Explain your answer. (5 points)

2. extend the C0 grammar such that statements can also can be the mixed language assignments (30 points)

   - $gpr(j) = e\ \{J\}$
   - $e = gpr(j)\ \{J\}$

3. prove lemma 127. Hint: this is an easy consequence of the invariants for expression evaluation. (30 points)

4. (a) give a simple example of a C+A program, where after execution of an inline assembly portion the MIPS configuration $d$ is not a consistency point. (5 points)

   (b) how many MIPS steps are needed in your example to reach a consistency point. (5 points)

   (c) give an example, where after leaving the inline assembly portion 2 MIPS steps are needed to reach a consistency point. (5 points)