CS3133
HW #2

DUE: Friday, September 8

1. (6 points) Describe the language $L$ generated by the following recursive definition:
   
i) $\lambda \in L$.
   
ii) If $u \in L$, then $aaaub \in L$.
   
iii) A string $u$ belongs to $L$ only if it can be obtained by a finite number of
   applications of rule ii) to rule i).

2. (6 points) Do Exercise 5 from Chapter 2 of our text. That is, give a recursive definition of the
language $L=\{a^ib^j | 0 < i < j\}$.

3. (3 points) Do Exercise 10 from Chapter 2 of our text.

4. (1 point) Do Exercise 12 from Chapter 2 of our text.

5. (1 point) Do Exercise 13 from Chapter 2 of our text.

6. (3 points) Do Exercise 17 from Chapter 2 of our text.

7. (6 points) For each of the following regular expression identities, tell whether or not it is true
for all regular expressions $u$, $v$ and $w$? If you claim an identity is false, give an example
(instances of $u$, $v$ and $w$) for which it doesn’t hold.
   
   a) $u(vu)^* = (uv)^* u$
   
   b) $u \cup (vw) = (uv) \cup (uw)$
   
   c) $uv^* (v \cup w^*) = (uv^* v) \cup (uv^* w^*)$