6.035 Spring 2016 Test I

I) 1. $(a|b)^* ab$

2.

a, b   (or as in 3.)

3.
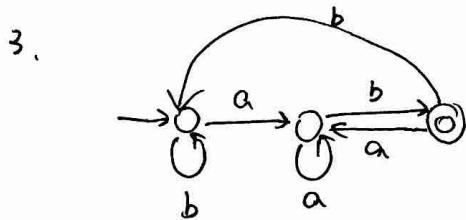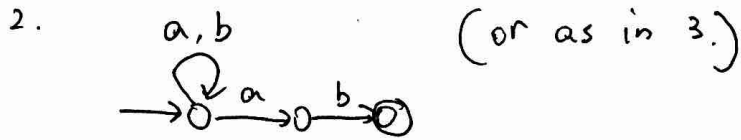
II) 4.   Y, X, S

5.   Last(S) = {c, d}

Last (X) = {c, d}

Last (Y) = {d}

Last (cX) = {c, d}

Last (dY) = {d}

6.   Right recursion: X → cX   or   Y → dY

7.   d :

(or dd, cd, etc.)
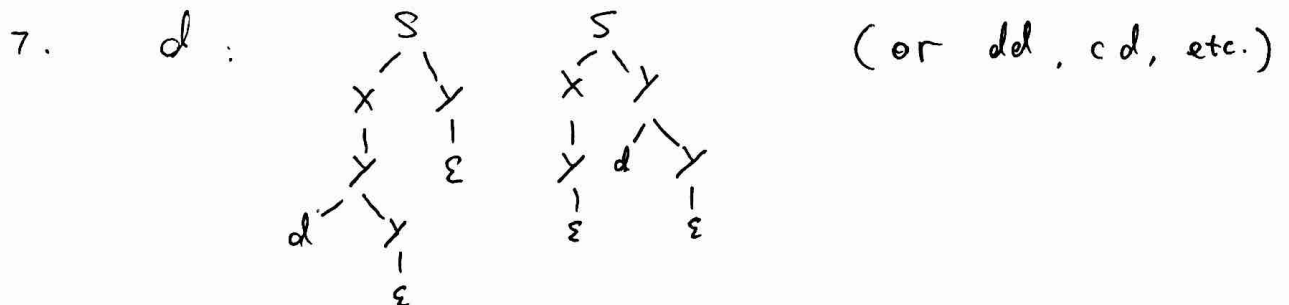
8. A)

$S \to X Y$ (or $S \to S d$ or other equivalent grammars)

$X \to X c$ $S \to X$

$X \to \varepsilon$ $X \to X c$

$Y \to Y d$ $X \to \varepsilon$

$Y \to \varepsilon$

B). $c^* d^*$

III) 9. $!(p \&\& q)$

10.
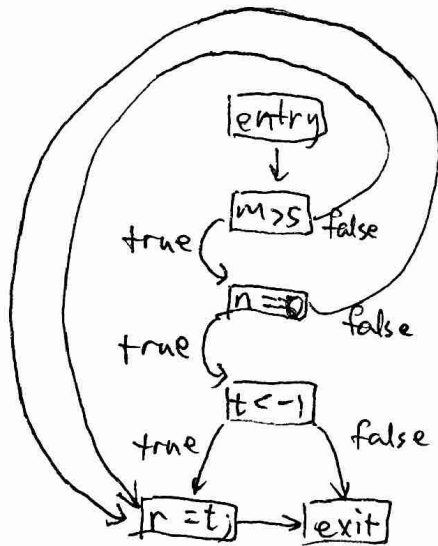
11. $b_2 = shortcircuit(c_2, f, t);$

$b_1 = shortcircuit(c_1, b_2, t);$

return b_1;

IV) 12. A) b

B) a+b

C) a+b

13. It did not preserve the value in %rbx.

14. A) No: The caller has to push all registers (that it cares about) to the stack before invoking the callee. This process happens n times whenever $g()$ is called. It is hard to optimize $g()$ with registers.

Yes: We can make $f()$ inline and there would be no harm to the performance of $g()$.

B) No. The callee cannot both update this register with the return value and keep it the same as before entering callee.