Discussion 6 Problems (Not Graded)

Read SmallC Formal Operational Semantics:
https://github.com/anwarmamat/cmsc330spring18-public/blob/master/p3b/semantics.pdf

Use the rules to show:

•; 1 → 1 •; 2 → 2 3 is 1 + 2
•; 1 + 2 → 3 •; 3 → 3 9 is 3 * 3
•; (1 + 2) * 3 → 9

•[x |→ true](x) = true
•[x |→ true]; x → true •[x |→ true]; true → true
•[x |→ true]; x == true → true false is ¬true
•[x |→ true]; !(x == true) → false

•(x) not defined •[x |→ 0](x) = 0 •[x |→ 0]; 2 → 2
int x → •[x |→ 0] •[x |→ 0]; x = 2 → •[x |→ 2]
•; int x; x = 2 → •[x |→ 2]

(1) •[i |→ 0]; i < 1 → true
(2) •[i |→ 0]; i = i + 1 → •[i |→ 1]
(3) •[i |→ 1]; while (i < 1) (i = i + 1) → •[i |→ 1]
•[i |→ 0]; while (i < 1) (i = i + 1) → •[i |→ 1]

•[i |→ 0](i) = 0
•[i |→ 0]; i → 0 •[i |→ 0]; 1 → 1 true is 0 < 1
(1) •[i |→ 0]; i < 1 → true

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                                  •[i |→ 0](i) = 0
                                  •[i |→ 0]; i → 0 •[i |→ 0]; 1 → 1 1 is 0 + 1
    •[i |→ 0](i) = 0  •[i |→ 0]; i + 1 → 1
(2) •[i |→ 0]; i = i + 1 → •[i |→ 1]

    •[i |→ 1](i) = 1
    •[i |→ 1]; i → 1  •[i |→ 1]; 1 → 1  false is 1 < 1
    •[i |→ 1]; i < 1 → false
(3) •[i |→ 1]; while (i < 1) (i = i + 1) → •[i |→ 1]
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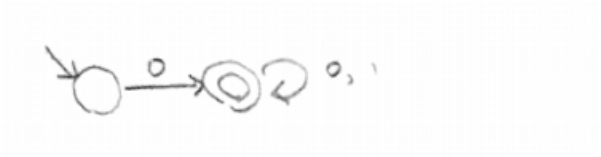
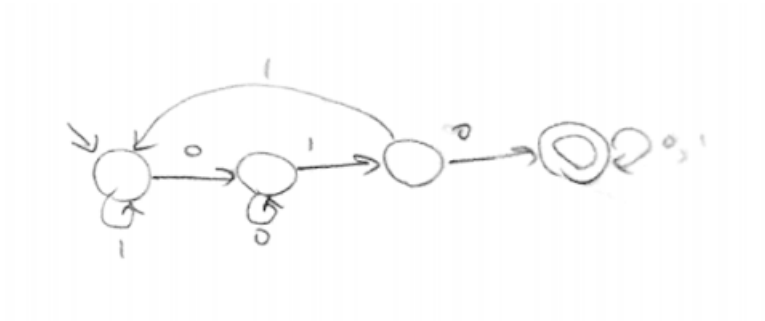
Create a FA over $\Sigma = \{0, 1\}$ that:

Accepts strings that start w/ 0.
(Accepts: "0", "010". Rejects: "", "100".)



Accepts strings w/ all 0s or all 1s.
(Accepts: "000", "111". Rejects: "", "010".)

Accepts strings w/ the substring "010".
(Accepts: "010", "01010". Rejects: "00", "0110".)



Accepts strings that have a 0 mod 3 0s and 0 mod 3 1s.
(Accepts: "", "000", "000000111". Rejects: "0", "010".)