Tutorial 3

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Exercise 1

$$\forall x.a(x) \implies \exists y.c(y) \land y > x$$

1 Exercise 2

$\forall x, y.b(x) \land b(y) \land x < y \land (\forall z.x < z < y \implies a(z)) \land \exists O, E. \land (suc(x, y) \lor (\forall z.x < z < y \iff z \in O \oplus z \in E. \land \exists xsyp.suc(x, xs) \land suc(yp, y) \land xs \in O \land ys \in E. \land \forall z, zs.x < z < zs < y \land suc(z, zs).z \in O \iff zs \in E \land z \in E \iff zs \in O))$

Exercise 3

We can transform automaton to be without epslion transitions.

Our states is powerset of old states. Initial/Accepting state is powerset of old initial/accepting states.

Transition beetwen two states is possible if all old states beloning to our state can travel somewhere. If yes, then we transfrom all old states to their all transtions. And its our new state.

Exercise 4

definicja suc(x,y)

$$\forall z.z > x \implies z = y \lor z > y$$

definicja $x < y$

$\exists P.x \in P \land y \in P \land (\forall z \in P.\neg(succ(z, x) \lor succ(y, z))) \land (\forall z \in P.x \neq z \implies \exists p.succ(p, z)) \land (\forall z \in P.y \neq z \implies \exists s.succ(z, s))$

So all 3 are eqvialent, which woudlnt be true in FSO.

Exercise 6

purse is easily contained in MSO define all 3 constructions.

Mso is definable in pure we just need singleton quantifiers. $kwant(x).(\forall y. y \subseteq x \implies x = y \vee y = \emptyset)$

Exercise 7

We are doing the same proof as on lecture. But Instead $X_0, \ldots, X_{m-1}$. We define sets B_i which tell us for each x, does X_k corrensponding to x has i-th bit set to true($bit_i(k)$)?