Alex Tibelius (418656) & Marc Gehring (358302) – Tutorium 10

A3 a)

n = 0:

$$\sum_{i=1}^{0} i^2 = 0 = \frac{0 * 1 * 1}{6}$$

n = k:

$$\sum_{i=1}^{k} i^2 = \frac{k * (k+1) * (2k+1)}{6}$$

n = k + 1:

$$\sum_{i=1}^{k+1} i^2 = (k+1)^2 + \sum_{i=1}^{k} i^2 = HS = (k+1)^2 + \frac{k * (k+1) * (2k+1)}{6}$$
$$= (k+1) * \left(k + 1 + \frac{k * (2k+1)}{6}\right) = (*)$$

$$\frac{(k+2) * (2 * (k+1) + 1)}{6} = \frac{(k+2) * (2k+3)}{6} = \frac{2k^2 + 7k + 6}{6}$$

$$und$$

$$k + 1 + \frac{k * (2k+1)}{6} = \frac{6 * (k+1) + k * (2k+1)}{6} = \frac{2k^2 + 7k + 6}{6}$$

$$\Rightarrow (*) = \frac{(k+1) * \big((k+1) + 1\big) * (2(k+1) + 1)}{6}$$

A3 b)

RHS: right-hand side (der Gleichung)

L = CREATE():

RHS: LENGTH(OVERWRITE(a,CREATE())) = 0
LHS: LENGTH(CREATE()) = 0

L = L:

LENGTH(OVERWRITE(a,L)) = LENGTH(L)

L = INSERT(x,L):

LHS: LENGTH(OVERWRITE(a,INSERT(x,L))) = LENGTH(INSERT(a,L)) = 1 + LENGTH(L)
RHS: LENGTH(INSERT(x,L)) = 1 + LENGTH(L)

L = INSERT*(x,L):

LHS: LENGTH(OVERWRITE(a, INSERT*(x,L))) = LENGTH(INSERT*(x, OVERWRITE(a,L)))
= 1 + LENGTH(OVERWRITE(a,L)) $=^{IH}$= 1 + LENGTH(L)
RHS: LENGTH(INSERT*(x,L)) = 1 + LENGTH(L)

A4 a)

Mit den Axiomen aus der Vorlesung:

Insert*(A,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))

A → I1 → I2 → I3 → S

Delete(Insert*(A,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))) =
Insert*(A,Delete(Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))) =
Insert*(A,Insert(I2,Insert(I3,Insert(S,Create()))))

A → I2 → I3 → S

Next(Insert*(A,Insert(I2,Insert(I3,Insert(S,Create()))))))) =
Insert*(A,Next(Insert(I2,Insert(I3,Insert(S,Create()))))))) =
Insert*(A,Insert*(I2,Insert(I3,Insert(S,Create()))))

A → I2 → I3 → S

Insert(I4,Insert*(A,Insert*(I2,Insert(I3,Insert(S,Create()))))))
Insert*(A,Insert(I4,Insert*(I2,Insert(I3,Insert(S,Create()))))))
Insert*(A,Insert*(I2,Insert(I4,Insert(I3,Insert(S,Create()))))))

A → I2 → I4 → I3 → S

A4 b)

Previous(Create()) = Create()
Previous(Insert(x,Insert(y,z))) = Insert(x,Insert(y,z))*
Previous(Insert(x,Insert*(y,z))) = Insert*(x,Previous(Insert*(y,z)))*

Insert*(A,Insert*(I1,Insert(I2,Insert(I3,Insert(S,Crate()))))))

A ⇌ I1 ⇌ I2 ⇌ I3 ⇌ S

Previous(Insert*(A,Insert*(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))
Insert*(A,Previous(Insert*(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))
Insert*(A,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))

A ⇌ I1 ⇌ I2 ⇌ I3 ⇌ S
Insert(I4,Insert*(A,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))
Insert*(A,Insert(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))

A ⇌ I4 ⇌ I1 ⇌ I2 ⇌ I3 ⇌ S

Next(Insert*(A,Insert(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create())))))))
Insert*(A,Next(Insert(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create())))))))
Insert*(A,Insert*(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create()))))))

A ⇌ I4 ⇌ I1 ⇌ I2 ⇌ I3 ⇌ S

Delete(Insert*(A,Insert*(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create())))))))
Insert*(A,Delete(Insert*(I4,Insert(I1,Insert(I2,Insert(I3,Insert(S,Create())))))))
Insert*(A,Insert*(I4,Delete(Insert(I1,Insert(I2,Insert(I3,Insert(S,Create())))))))
Insert*(A,Insert*(I4,Insert(I2,Insert(I3,Insert(S,Create()))))))

A ⇌ I4 ⇌ I2 ⇌ I3 ⇌ S

Hier noch übersichtlicher mit der Erklärung aus dem Tutorium: