

Portfolio Problem X – Draft Y

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February 8, 2014

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Proposition 1. *If a and b are type 2 integers, then $a \cdot b$ is a type 1 integer.*

Proof. We assume that a and b are type 2 integers and will prove that $a \cdot b$ is a type 1 integer. Since a and b are type 2 integers, there exist integers m and n such that

$$a = 3m + 2 \quad \text{and} \quad b = 3n + 2.$$

We can now use substitution and algebra

$$\begin{aligned} ab &= (3m + 2)(3n + 2) \\ &= 9mn + 6m + 6n + 4 \\ &= 9mn + 6m + 6n + 3 + 1 \end{aligned}$$

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