

# Portfolio Problem 1 – Draft 1

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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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