

Exploration 16

Math 2001–002, Fall 2016

October 24, 2016

Theorem 1. *Suppose that n and d are integers where $d > 0$. Then there are unique integers q and r such that $0 \leq r < d$ and $n = qd + r$.*

Question 2. Diagram the theorem statement.

Question 3. State and diagram the negation of the theorem statement.

Question 4. Create examples to test the validity of the theorem.

Question 5. Set up a proof of the theorem using

(i) direct proof,

(ii) proof by induction on n ,

(iii) proof by induction on d ,

(iv) proof by strong induction on d .

Question 6. Decide which proof technique will work best and use it to prove the theorem.