ธัชชะ บุ้งทอง 623021039-4
Section 2

Quiz 6

จงหา gcd(a,b) ต่อไปนี้โดย division algorithm

Theorem 2.6 (Euclidean Algorithm). *Let a and b be integers, with b positive. If $b|a$, then $(a, b) = b$. Otherwise, apply the division algorithm repeatedly. Let*

$$\begin{aligned} a &= bq_1 + r_1 \\ b &= r_1 q_2 + r_2 \\ r_1 &= r_2 q_3 + r_3 \\ &\vdots \\ r_{k-2} &= r_{k-1} q_k + r_k \\ r_{k-1} &= r_k q_{k+1} + 0, \end{aligned}$$

where $q_i, r_i \in \mathbb{Z}$ for all i and $0 < r_k < r_{k-1} < \cdots < r_1 < b$. Then $(a, b) = r_k$.

Theorem 2.4 (Division Algorithm). *Let $a, b \in \mathbb{Z}$ with $b > 0$. Then there exist unique integers q and r such that $a = bq + r$, with $0 \le r < b$.*

① $a = 2563$, $b = 2020$

$$\begin{aligned} 2563 &= (2020)(1) + 543 \\ 2020 &= 543(3) + 391 \\ 543 &= 391(1) + 152 \\ 391 &= 152(2) + 87 \\ 152 &= 87(1) + 65 \\ 87 &= 65(1) + 22 \\ 65 &= 22(2) + 21 \\ 22 &= 21(1) + 1 \quad \leftarrow \gcd(2563, 2020) = 1 \\ 21 &= (1)(21) + 0 \end{aligned}$$

② $a = 1800$, $b = 504$

$$\begin{aligned} 1800 &= 504(3) + 288 \\ 504 &= 288(1) + 216 \\ 288 &= 216(1) + 72 \quad \leftarrow \gcd(1800, 504) = 72 \\ 216 &= 72(3) + 0 \end{aligned}$$