

MTH 354

10-2-17

Example of finding GCD using Euclidean algo

*1) $\text{GCD}(273, 110)$

$$\begin{aligned} \textcircled{1} \quad & 273 = 2(110) + 53 \\ \textcircled{2} \quad & 110 = 2(53) + 4 \\ \textcircled{3} \quad & 53 = 13(4) + 1 \\ \textcircled{4} \quad & 4 = 4(1) + 0 \end{aligned}$$

273 and 110 are relatively prime.

$$\begin{aligned} \text{GCD}(273, 110) &= 1 = 53 - 13(4) \quad \text{by } \textcircled{3} \\ &= 53 - 13[110 - 2(53)] \quad \text{by } \textcircled{2} \\ &= 53 - 13(110) + 26(53) \\ &= 27(53) - 13(110) \\ &= 27[273 - 2(110)] - 13(110) \quad \text{by } \textcircled{1} \\ &= 27(273) - 54(110) - 13(110) \\ &= 27(273) - 67(110) \end{aligned}$$

$$s = 27, t = -67$$

Example of finding GCD using Euclidean algo.

#2) $\text{GCD}(273, 110)$

$$\begin{array}{ll} \textcircled{1} & 273 = 2(110) + 53 \\ \textcircled{2} & 110 = 2(53) + 4 \\ \textcircled{3} & 53 = 13(4) + \textcircled{1} \\ \textcircled{4} & 4 = 4(1) + \underline{0} \end{array}$$

273 and 110 are relatively prime.

$$\begin{aligned} \text{GCD}(273, 110) &= 1 = 53 - 13(4) \quad \text{by } \textcircled{3} \\ &= 53 - 13[110 - 2(53)] \quad \text{by } \textcircled{2} \\ &= 53 - 13(110) + 26(53) \\ &= 27(53) - 13(110) \\ &= 27[273 - 2(110)] - 13(110) \quad \text{by } \textcircled{1} \\ &= 27(273) - 54(110) - 13(110) \\ &= 27(273) - 67(110) \end{aligned}$$

$$s = 27, t = -67$$