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(5.3.2) MTH 354 9-28-17
Thm 6: If a is a nonnegative integer, b is a positive integer
and $r = a \bmod b$, then

$$\gcd(a, b) = \gcd(b, r)$$

pf:

09.28.2017 1:29p

9/28/17, 6:31 AM, 18m 14s

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pf:

Use Euclidean algo to find $\text{GCD}(190, 34)$

$$\begin{array}{lcl} \textcircled{1} & 190 & = 34(5) + 20 \\ \textcircled{2} & 34 & = 20(1) + 14 \checkmark \\ \textcircled{3} & 20 & = 14(1) + 6 \checkmark \\ \textcircled{4} & 14 & = 6(2) + \textcircled{2} \checkmark \\ \textcircled{5} & 6 & = 2(3) + \underline{0} \end{array}$$

$$\text{GCD}(190, 34) = 2$$

Find $\text{GCD}(128, 77)$

$$\begin{array}{l} 128 = 77(1) + 51 \\ 77 = 51(1) + 26 \\ 51 = 26(1) + 25 \\ 26 = 25(1) + \textcircled{1} \\ 25 = \textcircled{1}(25) + 0 \end{array}$$

$$\text{GCD}(128, 77) = 1$$

Relatively prime

$$\begin{aligned} \text{Find } \text{GCD}(190, 34) &= 2 = 14 - 2(6) && \text{by } \textcircled{4} \\ &= 14 - 2[20 - 1(14)] && \text{by } \textcircled{3} \\ &= 14 - 2(20) + 2(14) \\ &= 3(14) - 2(20) \\ &= 3[34 - 1(20)] - 2(20) && \text{by } \textcircled{2} \\ &= 3(34) - 3(20) - 2(20) \\ &= 3(34) - 5(20) \\ &= 3(34) - 5[190 - 5(34)] && \text{by } \textcircled{1} \\ &= 3(34) - 5(190) + 25(34) \\ &= 28(34) - 5(190) \end{aligned}$$