Homework#7 – Extended Euclidian Algorithm

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Use EEA to find s and t for gcd(12345,3473)

12345 s + 3473 t = gcd(12345,3473)

Step1: the Euclidian Algorithm

1. 12345 = 3473 3 + 1926
2. 3473 = 1926 1 + 1547
3. 1926 = 1547 1 + 379
4. 1547 = 379 × 4 + 31
5. 379 = 31 × 12 + 7
6. 31 = 7 × 4 + 3
7. 7= 3 × 2 + 1
8. 3 = 1 × 3 + 0

Therefore: gcd(12345,3473) = 1

Step 2: using the method of back-substitution

1 = 7 - 2×3 ------------------------------------------------------------------------------(7)

= 7 – 2 × (31 - 4 × 7) = 9×7 - 2 × 31----------------------------------------------(6)

= 9×7 - 2 × 31 = 9 × (379 -12 × 31) - 2 × 31------------------------------------ (5)

= 9 × 379 – 110 × 31 = 9 × 379 – 110 × (1547- 4 × 379) --------------------(4)

= 449 × 379 – 110 × 1547 =449 × (1926-1547) – 110 × 1547 -------------(3)

= 449 × 1926 – 559 × 1547 = 449 × 1926 – 559 × (3473-1926) -----------(2)

=1008 × 1926 – 559 × 3473 = 1008 × (12345- 33347) – 559 × 3473

= **1008** × 12345 + (**–3583)** × 3473