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Diophantine Equations: Code

Quiz • 20 min

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Due Jan 8, 11:59 PM IST

1. Try to use extended Euclid's algorithm to solve Diophantine equations efficiently. **1 / 1 point**

Given three numbers $a > 0, b > 0$, and c, the algorithm should return some x and y such that

$$ax + by = c$$

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```
def extended_gcd(a, b):
  assert a >= b and b >= 0 and a + b > 0
  if b == 0:
    d, x, y = a, 1, 0
  else:
    (d, p, q) = extended_gcd(b, a % b)
    x = q
    y = p - q * (a // b)
  assert a % d == 0 and b % d == 0
  assert d == a * x + b * y
  return (d, x, y)

def gcd(a, b):
  swapped = False
  if a < b:
    a, b, swapped = b, a, True
  d, x, y = extended_gcd(a, b)
  if swapped:
    x, y = y, x
  return (d, x, y)

def diophantine(a, b, c):
  d, x, y = gcd(a,b)
  assert c % d == 0
  k = c // d
  # return (x, y) such that a * x + b * y = c
```

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