1. Enter number

If number % 7 does not = 0

if number % 5 does not = 0

if number % 3 does not = 0

if number % 2 does not = 0

print “Number is prime”

else

print “Number is not prime”

1. Assume is rational, therefore two integers exist so that

Assuming a and b are coprime

If is even then is even, therefore an integer exists so that

Therefore b is even, this contradicts the assumption that a and b are coprime therefore is irrational

1. 1. 1. Caesar Cipher converts each letter to a number, A = 1, B = 2 and so on up until Z = 26.
      2. A key is used to denote the number of steps away from the original number, in this case 13, so if A=1, 1+13 = 14, 14 = N.
      3. However it is not as simple as just adding, any number higher than 13 would be out of scope, instead the key is subtracted from the original number, then 26 is added and then the number is modulus divided by 26 giving the remainder which then corresponds to the new letter.
      4. T = 20, 20 – 13 = 7, 7 + 26 = 33, 33 % 26 = 7, 7 = G this gives the same result as counting on to the last letter and then cycling back to the start.
      5. Plaintext P = SECRET

S = 19, 19 – 13 = 6, 6 + 26 = 32, 32 % 26 = 6, 6 = F

E = 5, 5 – 13 = -8, -8 + 26 = 18, 18 % 26 = 18, 18 = R

C = 3, 3 – 13 = -10, -10 +26 =16, 16 % 26 = 16, 16 = P

R = 18, 18 – 13 = 5, 5 + 26 = 31, 31 % 26 = 5, 5 = E

E = 5, 5 – 13 = -8, -8 + 26 = 18, 18 % 26 = 18, 18 = R

T = 20, 20 – 13 = 7, 7 + 26 = 33, 33 % 26 = 7, 7 = G

Ciphertext C = FRPERG

* 1. 1. Applying the same process to the ciphertext with the same key
     2. Ciphertext C = FRPERG

F = 6, 6 - 13 = - 7, -7 + 26 = 19, 19 % 26 = 19, 19 = S

R = 18, 18 – 13 = 5, 5 + 26 = 31, 31 % 26 = 5, 5 = E

P = 16, 16 – 13 = 3, 3 + 26 = 29, 29 % 26 = 3, 3 = C

E = 5, 5 – 13 = -8, -8 + 26 = 18, 18 % 26 = 18, 18 = R

R = 18, 18 – 13 = 5, 5 + 26 = 31, 31 % 26 = 5, 5 = E

G = 7, 7 – 13 = -6, -6 + 26 = 20, 20 % 26 = 20, 20 = T

Ciphertext C’ = SECRET

* 1. Ciphertext C’ is equivalent to plaintext P, this is due to the cyclic nature of the cipher and the use of the same key