Aufgabe 1
Fall 1:
Schritt 1: Phi berechnen
phi = (e1 * d1 - 1) / gcd(e1, d1) = 144
Schritt 2 das multiplikative inverse finden für e2 (mod 144)
d2 = lift(Mod(e2, phi)^-1) = 103

Fall 2:
factors = factor(m)
p = factors[1,1]
q = factors[2,1]
phi = (p-1)*(q-1) = 192
d2 = lift(Mod(e2, phi)^-1) = 11

Aufgabe 2:
$x \equiv 2 \pmod{15}$
$x \equiv 6 \pmod{22}$
$x \equiv 121 \pmod{391}$

In Pari/gp:
m1 = 15
m2 = 22
m3 = 391
c1 = 2
c2 = 6
c3 = 121
e = 3
M1 = m2 * m3
M2 = m1 * m3
M3 = m1 * m2

```
u1 = Mod(M1^-1, m1)
u2 = Mod(M2^-1, m2)
u3 = Mod(M3^-1, m3)
x_unmod = c1 * lift(u1) * M1 + c2 * lift(u2) * M2 + c3 * lift(u3)
* M3
x = Mod(x_unmod, 15*22*391)
klartext = lift(x)^(1/3)
```

Resultat: 8

Aufgabe 3:

$n \equiv 1 \pmod 2$
$n \equiv 1 \pmod 3$
$n \equiv 1 \pmod 4$
$n \equiv 2 \pmod 5$

} nicht teilerfremd. $n \equiv 1 \pmod 2$ wird gestrichen

Danach gleich wie oben:

```
m1 = 3
m2 = 4
m3 = 5
c1 = 1
c2 = 1
c3 = 2
M1 = m2 * m3
M2 = m1 * m3
M3 = m1 * m2
u1 = Mod(M1^-1, m1)
u2 = Mod(M2^-1, m2)
```

```
u3 = Mod(M3^-1, m3)
x_unmod = c1 * lift(u1) * M1 + c2 * lift(u2) * M2 + c3 * lift(u3)
* M3
x = Mod(x_unmod, 3 * 4 * 5)
```

Resultat: 37 (mod 60)