Aufgabe 1

(1) $u = acgacgtag, v = ggacgtgcag$
$q = 2$:
$u : ac \to 2, cg \to 2, ga \to 1, gt \to 1, ta \to 1, ag \to 1$
$v : gg \to 1, ac \to 1, ga \to 1, cg \to 1, gt \to 1, tg \to 1, gc \to 1, ca \to 1, ag \to 1$
$qwdist_2(u, v) = 7$

$q = 3$:
$u : acg \to 2, cga \to 1, gac \to 1, cgt \to 1, gta \to 1, tag \to 1$
$v : gga \to 1, gac \to 1, acg \to 1, cgt \to 1, gtg \to 1, tgc \to 1, gca \to 1, cag \to 1$
$qwdist_3(u, v) = 9$

(2) $edist_\delta(u, v) = 4$
optimales Alignment:

```
acgacgt--ag
  |||||   ||
-ggacgtgcag
```

(3) $u = ryrryryrr, v = rrryryryrr$
$q = 2$:
$u : ry \to 3, yr \to 3, rr \to 2$
$v : rr \to 3, ry \to 3, yr \to 3$
$qwdist_2(u, v) = 1$

$q = 3$:
$u : ryr \to 3, yrr \to 2, rry \to 1, yry \to 1$
$v : rrr \to 1, rry \to 1, ryr \to 3, yry \to 2, yrr \to 1$
$qwdist_3(u, v) = 3$

$edist_\delta(u, v) = 2$

(4) $u = abab, v = abba$
$u : ab \to 2, ba \to 1$
$v : ab \to 1, ba \to 1, bb \to 1$
$2 = edist_\delta(u, v) = qwdist_2(u, v) = 2$

$u = abaca, v = ababa$
$u : ab \to 1, ba \to 1, ac \to 1, ca \to 1$
$v : ab \to 2, ba \to 2$
$1 = edist_\delta(u, v) < qwdist_2(u, v) = 4$

$u = abbb, v = bbabb$
$u : ab \to 1, bb \to 2$
$v : bb \to 2, ba \to 1, ab \to 1$
$2 = edist_\delta(u, v) > qwdist_2(u, v) = 1$

Aufgabe 3

$u = agtgcacacatc, v = atcacacttagc$
Zerlegung von u in Bezug auf v
$\Psi_{lr} = (ag, t, gc, a, caca, t, c)$
$\Psi_{rl} = (a, g, t, g, caca, c, atc)$
Zerlegung von v in Bezug auf u
$\Psi_{lr} = (atc, a, cac, t, t, a, gc)$
$\Psi_{rl} = (a, t, cacac, t, t, a, gc)$