[　　5-1](30　)

- $(\forall y)(\forall z)(\exists u)(\forall v)(\exists w)(\exists x)P(x,y,z,u,v,w)$

- $(\exists x)(\forall y)(\forall z)(\exists u)(\forall v)(\exists w)P(x,y,z,u,v,w)$

- $(\forall x)(\forall y)(\exists z)(\forall w)(\exists u)(P(x,y)\vee(Q(z,w)\wedge R(u)))$

(　　)

f,g,h

$(\forall y)(\forall z)(\exists u)(\forall v)(\exists w)(\exists x)P(x,y,z,u,v,w)$
  $= (\forall y)(\forall z)(\forall v)P(h(y,z,v),y,z,f(y,z),v,g(y,z,v))$

$(\exists x)(\forall y)(\forall z)(\exists u)(\forall v)(\exists w)P(x,y,z,u,v,w)$
  $= (\forall y)(\forall z)(\forall v)P(a,y,z,f(y,z),v,g(y,z,v))$

$(\forall x)(\forall y)(\exists z)(\forall w)(\exists u)(P(x,y)\vee(Q(z,w)\wedge R(u)))$
  $= (\forall x)(\forall y)(\exists z)(\forall w)(\exists u)((P(x,y)\vee Q(z,w))\wedge(P(x,y)\vee R(u)))$
  $=(\forall x)(\forall y)(\forall w)((P(x,y)\vee Q(f(x,y),w))\wedge(P(x,y)\vee R(g(x,y,w))))$

[　　5-2](20　)

$(\forall x)(P(x)\rightarrow(\exists y)((Q(x,y)\rightarrow P(a))\wedge(\forall z)(Q(y,z)\rightarrow P(x))))$

(　　)

$(\forall x)(P(x)\rightarrow(\exists y)((Q(x,y)\rightarrow P(a))\wedge(\forall z)(Q(y,z)\rightarrow P(x))))$
  $= (\forall x)(P(x)\rightarrow(\exists y)((\neg Q(x,y)\vee P(a))\wedge(\forall z)(\neg Q(y,z)\vee P(x))))$
  $= (\forall x)(\neg P(x)\vee(\exists y)((\neg Q(x,y)\vee P(a))\wedge(\forall z)(\neg Q(y,z)\vee P(x))))$
  $= (\forall x)(\exists y)(\forall z)((\neg P(x)\vee(\neg Q(x,y)\vee P(a)))\wedge(\neg P(x)\vee(\neg Q(y,z)\vee P(x))))$

$= (\forall x)(\exists y)(\forall z)(\neg P(x) \vee (\neg Q(x,y) \vee P(a)))$ $\quad (\because \neg P(x) \vee \neg Q(y,z) \vee P(x) = \mathbf{T}$

$= (\forall x)(\neg P(x) \vee \neg Q(x,f(x)) \vee P(a))$

$$\{\{\neg P(x), \neg Q(x,f(x)), P(a)\}\}$$