Question 1

a) $P(B, A, B)$, $P(X, Y, Z) \rightsquigarrow P(A, B, B)$

$X = B$, $Y = A$, $Z = B$ $\Rightarrow$ is unifiable

b) $P(X, X)$, $Q(A, A)$ two different function $\rightarrow$ is Not unifiable.

c) older (Father(y), (y) , older (Father(x), John)

$Y = John$, $X = John$ $\Rightarrow$ is unifiable

D) $Q(G(Y, Z), G(Z, Y))$, $Q(G(X, X), G(A, B))$

1) $X = Y$, $X = Z$ $\Rightarrow Y = Z$

2) $Z = A$, $Y = B$ $\Rightarrow Y \neq Z$ if $(A \neq B)$

} Not unifiable if $A \neq B$

E) $P(f(x), x, g(x))$, $P(f(Y), A, Z)$

$X = Y$, $X = A$ $X = Z$ $\Rightarrow$ is unifiable

$\Rightarrow P(f(A), A, g(A))$

Question 2

$\forall x \neg Pride(x) \vee Smart(x)$

$Pride(Tom)$

$\Rightarrow$ $x = Tom$

$\neg Pride(Tom) \vee Smart(Tom)$, $Pride(Tom)$

$Smart(Tom)$

$\forall x \forall Y \; old(x) \vee \neg tall(Y) \vee \neg teach(x, Y)$

$tall(Eric)$

$teach(Tom, Eric)$

$X = Tom$, $Y = Eric$

$\rightarrow old(Tom) \vee \neg Tall(Eric) \vee \neg teach$

$(Tom, Eric)$, $Tall(Eric) Teach(Tom, Eric)$

$\Rightarrow old(Tom)$

$\forall x \neg old(x) \vee \neg smart(x) \vee kind(x)$

$smart(Tom)$

$old(Tom)$

$\Rightarrow$ $old(Tom) \vee \neg smart(Tom) \vee Kind(Tom)$,

$smart(Tom)$, $old(Tom)$

$\rightarrow Kind(Tom)$

Question 3

Query : $\exists x\, Q(Alice, x)$

$\forall x, y\ S(x, y) \Rightarrow Q(y, x)$:

for $Q(Alice, x)$ we need to prove $S(x, Alice)$

$S(Bob, Alice) \Rightarrow x = Bob$

$\forall x, y\ T(x, y, x) \Rightarrow Q(x, y)$

$\Rightarrow Q(Alice, y) \rightsquigarrow T(Alice, y, Alice) \rightsquigarrow$ Down

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$\forall x, y\ T(x, x, y) \Rightarrow Q(x, y)$

$\Rightarrow Q(Alice, y) \rightarrow T(Alice, Alice, y) \rightsquigarrow$ Not match