データベースシステム 中間確認1-3

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中間確認 1-3 $(\forall_x)((f(x)\ OR\ (\exists_x)(f(x)\ IMP\ g(x))\ IMP\ f(x)\ OR\ (\exists_x)(g(x)\ IMP\ NOT\ g(y))))$

$(\forall_x)(f(x)\ OR\ (\exists_x)((f(x)\ IMP\ g(x))\ IMP\ f(x)\ OR\ (\exists_x)(g(x)\ IMP\ NOT\ f(x))))$

$= (\forall_x)(f(x)\ OR\ (\exists_x)((f(x)\ IMP\ g(x))\ IMP\ f(x)\ OR\ (\exists_x)(NOT\ g(x)\ OR\ NOT\ g(y))))$

$= (\forall_x)(f(x)\ OR\ (\exists_x)((f(x)\ IMP\ g(x))\ IMP\ f(x)\ OR\ (\exists_x)(NOT\ g(x)\ OR\ NOT\ g(y))))$

$= (\forall_x)(f(x)\ OR\ (\exists_x)((f(x)\ IMP\ g(x))\ IMP\ f(x)\ OR\ (NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(y)))))$

(∵ 述語論理式の基本公式)

$= (\forall_x)(f(x)\ OR\ (\exists_x)((NOT\ f(x)\ OR\ g(x))\ IMP\ f(x)\ OR\ (NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(y)))))$

$= (\forall_x)(f(x)\ OR\ (\exists_x)(NOT(NOT\ f(x)\ OR\ g(x))\ OR\ f(x)\ OR\ (NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(y)))))$

$= (\forall_x)(f(x)\ OR\ (\exists_x)(NOT(NOT\ f(x))\ AND\ NOT\ g(x)\ OR\ f(x)\ OR\ (NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(y)))))$

(∵ ド・モルガンの公式)

$= (\forall_x)(f(x)\ OR\ (\exists_x)(f(x)\ AND\ NOT\ g(x)\ OR\ f(x)\ OR\ NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(y))))$

(∵ 二重否定)

$= (\forall_x)(f(x)\ OR\ (\exists_x)(f(x)\ AND\ NOT\ g(x)\ OR\ f(x)\ OR\ NOT\ (\exists_x)\ (g(x))\ OR\ NOT\ (\exists_x)\ (g(x))))$

(∵ 述語論理式の基本公式)

$= (\forall_x)(f(x)\ OR\ (\exists_x)(f(x)\ AND\ NOT\ g(x)\ OR\ f(x)\ OR\ NOT\ (\exists_x)\ (g(x))))$

(∵ 同一律)

$= (\forall_x)(f(x)\ OR\ (\exists_x)(f(x)\ AND\ NOT\ g(x)\ OR\ NOT\ (\exists_x)\ (g(x))))$

(∵ 同一律)

$= (\forall_x)(f(x)\ OR\ (\exists_x)(f(x)\ AND\ NOT\ g(x)))$

(∵ 同一律)

$= (\forall_x)(f(x)\ OR\ (\forall_x)(f(x))\ AND\ NOT\ (\forall_x)(g(x))$　(∵ 述語論理式の基本公式)

$= (\forall_x)(f(x)\ AND\ NOT\ (\forall_x)(g(x))$　(∵ 同一律)

$= (\forall_x)(f(x)\ AND\ NOT\ g(x))$