5) (c).

$$\neg\Big((\forall x(P(x) \vee Q(x))) \Rightarrow ((\forall x P(x)) \vee (\exists x Q(x)))\Big)$$

$$\neg\Big[\neg(\forall x(P(x) \vee Q(x))) \vee ((\forall x P(x)) \vee (\exists x Q(x)))\Big]$$

$$\neg\Big[(\exists x \neg(\neg P(x) \wedge \neg Q(x))) \vee (\forall x P(x) \vee (\exists x Q(x)))\Big]$$

$$\neg\Big[(\exists x (\neg P(x) \wedge \neg Q(x))) \vee (\forall x P(x) \vee (\exists x Q(x)))\Big]$$

$$\neg\Big[(\exists x \neg P(x) \vee \exists x \neg Q(x)) \vee ((\forall x P(x)) \vee (\exists x Q(x)))\Big]$$

$$\Big[((\forall x P(x)) \vee (\forall x Q(x))) \vee ((\exists x \neg P(x)) \vee (\forall x \neg Q(x)))\Big]$$

$\Rightarrow$ Contradiction $\therefore$ Hence proved.