

FI1005 Logikk: Øving 6

1. Finn ut hvorvidt setningene a-i nedenfor er sanne eller usanne, i den følgende tolkningen:

domene: Erna, Donald og Pekka

e : Erna

d : Donald

p : Pekka

$F(x)$: Pekka

$N(x)$: Erna

$G(x,y)$: $\langle \text{Erna, Pekka} \rangle, \langle \text{Donald, Erna} \rangle, \langle \text{Donald, Pekka} \rangle$

- a) $F(e)$
- b) $F(e) \vee N(e)$
- c) $\neg N(d) \rightarrow \neg F(p)$
- d) $\exists x N(x)$
- e) $\neg \exists x (F(x) \wedge N(x))$
- f) $\forall x (F(x) \vee N(x))$
- g) $\exists x \forall y G(x,y)$
- h) $\exists x \forall y (G(x,y) \vee x=y)$
- i) $\exists x \forall y (F(y) \rightarrow G(x,y))$

2. Vis at de følgende setningene er verken logisk sanne eller kontradiksjoner.

- a) $D(a) \wedge D(b)$
- b) $P(m) \wedge \neg \forall x P(x)$
- c) $\forall z J(z) \leftrightarrow \exists y J(y)$
- d*) $\forall x (W(x,m,n) \vee \exists y L(x,y))$
- e*) $\exists x (x=h \wedge x=i)$

3. Vis at de følgende setningsparene ikke er logisk ekvivalente med hverandre.

- a) $J(a), K(a)$
- b) $\exists x J(x), J(m)$
- c*) $\forall x (P(x) \rightarrow \neg Q(x)), \exists x (P(x) \wedge \neg Q(x))$
- d*) $\exists x (P(x) \wedge Q(x)), \exists x (P(x) \rightarrow Q(x))$
- e*) $\forall x (P(x) \wedge Q(x)), \forall x (P(x) \rightarrow Q(x))$
- f*) $\forall x \exists y R(x,y), \exists x \forall y R(x,y)$

4. Vis at de følgende argumentene ikke er logisk gyldige.

- a) $\exists x P(x) \therefore P(a)$
- b) $\forall x (P(x) \rightarrow Q(x)), Q(a) \therefore P(a)$
- c) $\exists x (P(x) \rightarrow Q(x)) \therefore \exists x P(x)$
- d) $R(d,e), \exists x R(x,d) \therefore R(e,d)$
- e*) $\forall x (R(x) \rightarrow D(x)), \forall x (R(x) \rightarrow F(x)) \therefore \exists x (D(x) \wedge F(x))$
- f*) $\exists x (E(x) \wedge F(x)), \exists x F(x) \rightarrow \exists x G(x) \therefore \exists x (E(x) \wedge G(x))$
- g*) $\forall x O(x,c), \forall x O(c,x) \therefore \forall x O(x,x)$
- h*) $\exists x (J(x) \wedge K(x)), \exists x \neg J(x), \exists x \neg K(x) \therefore \exists x (\neg J(x) \wedge \neg K(x))$
- i*) $\forall x (D(x) \rightarrow \exists y T(y,x)) \therefore \exists y \exists z \neg y=z$