MUAMMOLI MASALA VA TOPSHIRIQLAR:

1. $M=\{3,4,5,6,7,8\}$ to‘plamda ikkita $A(x)$: «x – tub son» va $B(x)$: «x – toq son» predikatlar berilgan. Bu predikatlarning chinlik jadvalini tuzing.

2. $M=\{1,2,3,...,20\}$ to‘plamda quyidagi predikatlar berilgan: $A(x)$: «x son 5ga qoldiqsiz bo‘linmaydi»; $B(x)$: «x – juft son»; $C(x)$: «x – tub son»; $D(x)$: «x son 3ga karrali». Quyidagi predikatlarning har biri uchun chinlik to‘plamni aniqlang:

a) $A(x)\wedge B(x)$; b) $C(x)\wedge B(x)$; d) $C(x)\wedge D(x)$;

e) $B(x)\wedge D(x)$; f) $\overline{B(x)}\wedge D(x)$; g) $A(x)\wedge\overline{D(x)}$;

h) $\overline{B(x)}\wedge\overline{D(x)}$; i) $A(x)\wedge B(x)\wedge D(x)$; j) $A(x)\vee B(x)$;

k) $B(x)\vee C(x)$; l) $C(x)\vee D(x)$; m) $B(x)\vee D(x)$;

n) $\overline{B(x)}\vee D(x)$; o) $B(x)\wedge\overline{D(x)}$; p) $A(x)\vee B(x)\vee D(x)$;

q) $C(x)\to A(x)$ r) $D(x)\to\overline{C(x)}$; s) $A(x)\to B(x)$;

t) $(A(x)\wedge C(x))\to\overline{D(x)}$; u) $(A(x)\wedge D(x))\to\overline{C(x)}$.

3. R to‘plamda $P(x)$: «$x^2+x+1>0$» va $Q(x)$: «$x^2-4x+3=0$» predikatlar berilgan bo‘lsin. Quyidagi mulohazalarning qaysilari chin, qaysilari esa yolg‘on ekanligini aniqlang:

a) $\forall xP(x)$; b) $\exists xP(x)$; d) $\forall xQ(x)$; e) $\exists xQ(x)$.

4. Quyidagi predikatlarning qaysi birlari aynan chin qiymatga ega bo‘ladi:

a) $x^2+y^2+(x+y)^2\geq 0$; b) $x^2+y^2+(x+y)^2>0$;

d) $\cos^2 x-\sin^2 x=\cos 2x$; e) $\sin 2x=2\sin x\cos x$;

f) $(x+1)^2<x-3$; h) $x^2+1\leq(x+1)^2$.

5. Quyidagi ifodalarning qaysilari predikatlar mantiqining formulasi bo‘lishini aniqlang. Har bir formula uchun erkin va bog‘langan o‘zgaruvchilarni aniqlang.

a) $\exists x\exists yP(x,y)$; b) $\forall xP(x)\vee\forall yQ(x,y)$; d) $\forall x\exists yP(x,y)$;

e) $p\to\forall xP(x,y)$; f) $\exists xP(x,y)\wedge Q(y,z)$.

6. $P(x,y)$: «$x < y$» predikat $M = \boldsymbol{N} \times \boldsymbol{N}$ to‘plamda aniqlangan bo‘lsin. Quyida berilgan predikatlarning qaysilari aynan chin va qaysilari aynan yolg‘onligini aniqlang:

a) $\exists x P(x,y)$; b) $\forall x P(x,y)$; d) $\exists y P(x,y)$;

e) $\forall y P(x,y)$ f) $\exists x \forall y P(x,y)$; g) $\forall x \exists y P(x,y)$;

7. Quyidagi teng kuchliliklarning to‘g‘riligini isbot qiling:

a) $\forall x A(x) \equiv \overline{\exists x \overline{A(x)}}$; b) $C \wedge \forall x A(x) \equiv \forall x (C \wedge A(x))$;

d) $\exists x A(x) \equiv \overline{\forall x \overline{A(x)}}$; e) $C \vee \forall x A(x) \equiv \forall x (C \vee A(x))$;

f) $\exists x (A(x) \vee B(x)) \equiv \exists x A(x) \vee \exists x B(x)$; g) $\exists x (C \vee A(x)) \equiv C \vee \exists x A(x)$.

8. $A(x)$ va $B(x)$ ixtiyoriy predikatlar bo‘lsin. Quyida berilgan formulalarning qaysilari $A(x) \to \overline{B(x)}$ formulaga teng kuchli bo‘lishini aniqlang.

a) $A(x) \vee B(x)$; b) $\overline{A(x)} \vee \overline{B(x)}$; d) $\overline{A(x)} \to B(x)$;

e) $\overline{B(x)} \to A(x)$; f) $\overline{\overline{A(x)} \wedge B(x)}$; g) $\overline{A(x) \wedge \overline{B(x)}}$.