

Задание 1.2

$$V = \{x, y_1, y_2, y_3, z\}$$

$$D_x = D_{y_1} = D_{y_2} = D_{y_3} = D_z = \mathbb{Z}$$

$$\varphi(x) \equiv x \geq 0$$

$$\psi(x, z) \equiv z^3 \leq x < (z+1)^3$$

$$S-A: x \geq 0 \Rightarrow q(x, 0, 1, 1)$$

$$A-F-A: (x \geq 0) \wedge (y_2 \leq x) \wedge q(x, y_1, y_2, y_3) \Rightarrow$$

$$\Rightarrow q(x, y_1+1, y_2+y_3+6y_1+6, y_3+6y_1+6)$$

$$A-T-H: (x \geq 0) \wedge (y_2 > x) \wedge q(x, y_1, y_2, y_3) \Rightarrow$$

$$\Rightarrow y_1^3 \leq x < (y_1+1)^3$$

$$y_1^3 \leq x < y_1^3 + 3y_1^2 + 3y_1 + 1$$

$$y_1 \leftarrow y_1 + 1$$

$$y_3 \leftarrow y_3 + 6y_1$$

$$y_2 \leftarrow y_2 + y_3$$

$$y_2' = y_2 + y_3 + 6y_1 + 6$$

$$\boxed{y_2 = (y_1+1)^3 \Rightarrow y_1' = (y_1+2)^3 = y_1^3 + 6y_1^2 + 12y_1 + 8}$$

$$y_1^3 + 6y_1^2 + 12y_1 + 8 = y_1^3 + 3y_1^2 + 3y_1 + 1 + y_3 + 6y_1 + 6$$

$$3y_1^2 + 3y_1 + 1 = y_3$$

тогда

$$q(x, y_1, y_2, y_3) = x \geq y_1^3 \wedge y_2 = y_1^3 + 3y_1^2 + 3y_1 + 1 \wedge y_3 = 3y_1^2 + 3y_1 + 1$$

$$S-A: x \geq 0 \Rightarrow 0 \geq 0 \wedge 1 = 0^3 + 3 \cdot 0 + 3 \cdot 0 + 1 \wedge 1 = 3 \cdot 0 + 3 \cdot 0 + 1 \Rightarrow 0 \geq 0 \wedge 1 = 1 \wedge 1 = 1$$

$$A-F-A: x \geq 0 \wedge y_2 \leq x \wedge x \geq y_1^3 \wedge y_2 = y_1^3 + 3y_1^2 + 3y_1 + 1 \wedge y_3 = 3y_1^2 + 3y_1 + 1 \Rightarrow x \geq y_1^3 \wedge$$

$$\wedge y_2 + y_3 + 6y_1 + 6 = y_1^3 + 6y_1^2 + 12y_1 + 8 \wedge y_3 + 6y_1 + 6 = 3y_1^2 + 3y_1 + 7$$

$$y_2 + y_3 + 6y_1 + 6 = y_1^3 + 6y_1^2 + 12y_1 + 8$$

$$y_3 + 6y_1 + 6 = 3y_1^2 + 3y_1 + 7$$

$$y_1^3 + 3y_1^2 + 3y_1 + 1 + 3y_1^2 + 3y_1 + 1 + 6y_1 + 6 = y_1^3 + 6y_1^2 + 12y_1 + 8$$

$$3y_1^2 + 3y_1 + 1 + 6y_1 + 6 = 3y_1^2 + 3y_1 + 7$$

$$y_1^3 + 6y_1^2 + 12y_1 + 8 = y_1^3 + 6y_1^2 + 12y_1 + 8$$

$$3y_1^2 + 3y_1 + 7 = 3y_1^2 + 3y_1 + 7$$

$$A-T-H: x \geq 0 \wedge y_2 > x \wedge x \geq y_1^3 \wedge y_2 = y_1^3 + 3y_1^2 + 3y_1 + 1 \wedge y_3 = 3y_1^2 + 3y_1 + 1 \Rightarrow y_1^3 \leq x < (y_1+1)^3$$

$$x < y_2 \Rightarrow x < (y_1+2)^3$$