$$\frac{dH}{dt} = \frac{\beta_H}{N}(N-C-H)H - (\delta_H + d_H)H$$

po ustawieniu danych z tabeli (problem 1):

$$\frac{dH}{dt} = H(0,1 - 0,001(\underset{0}{\underset{\shortparallel}{C}}+H))$$

$$\frac{dH}{dt} = H(0,1 - 0,001H)$$

$$\frac{dH}{dt} = \frac{H}{10} - \frac{H^2}{1000} \quad / \cdot dt$$

$$dH = \left(\frac{H}{10} - \frac{H^2}{1000}\right)dt \quad / \cdot 1000$$

$$1000\,dH = (100H - H^2)\,dt$$

$$\underbrace{\int \frac{dH}{100H - H^2}}_{①} = \int \frac{dt}{1000}$$

$$① \int \frac{dH}{100H - H^2} = -\int \frac{dH}{H(H-100)} =$$

$$= -\int -\frac{\frac{1}{H} - \frac{1}{H-100}}{100}\,dH =$$

$$= \frac{1}{100}\int \frac{1}{H}\,dH - \frac{1}{100}\int \frac{1}{H-100}\,dH =$$

$$= \frac{\ln H}{100} - \frac{\ln(H-100)}{100}$$

$$\frac{\ln H}{100} - \frac{\ln(H-100)}{100} = \frac{t}{1000} + C_2 \quad / \cdot 100$$

$$\ln H - \ln(H-100) = \frac{t}{10} + C_1 \qquad C_1 = 100 \cdot C_2$$

$$e^{\ln H - \ln(H-100)} = e^{t/10 + C_1}$$

$$\frac{H}{H-100} = Ce^{t/10} \qquad C = e^{C_1}$$

$$H = Ce^{t/10} \cdot (H-100)$$

$$H = H \cdot Ce^{t/10} - 100 \cdot Ce^{t/10}$$

$$H - H \cdot Ce^{t/10} = -100 \cdot Ce^{t/10}$$

$$H(1 - Ce^{t/10}) = -100 \cdot Ce^{t/10}$$

$$H = \frac{-100 \cdot Ce^{t/10}}{1 - Ce^{t/10}}$$

$$H = \frac{100 \cdot C \cdot e^{t/10}}{Ce^{t/10} - 1} = \frac{100 \cdot Ce^{t/10} \overset{0}{\overset{\shortparallel}{-100 + 100}}}{Ce^{t/10} - 1} = \frac{100(Ce^{t/10} - 1) + 100}{Ce^{t/10} - 1} =$$

$$= 100 + \frac{100}{Ce^{t/10} - 1}$$

$$\frac{dC}{dt} = \frac{\beta_c}{N}(N-C-H)C - (\delta_c + \alpha_c)C$$

po wstawieniu danych z tabeli (problem 1)

$$\frac{dC}{dt} = C\left(0{,}207 - \frac{0{,}45}{400}(C+\underset{\overset{\|}{0}}{H})\right)$$

$$\frac{dC}{dt} = C\left(0{,}207 - \frac{0{,}45}{400}C\right)$$

$$\frac{dC}{dt} = \frac{207}{1000}C - \frac{9}{8000}C^2$$

$$dC = \left(\frac{207}{1000}C - \frac{9}{8000}C^2\right)dt \quad / \cdot 8000$$

$$8000\,dC = (1656C - 9C^2)\,dt$$

$$\int \frac{dC}{1656C - 9C^2} = \int \frac{dt}{8000}$$

analogicznie do części 1

$$\int \frac{dC}{1656C - 9C^2} = -\int \frac{dC}{9(C^2 - 184C)} =$$

$$= -\frac{1}{9}\int \frac{dC}{C(C-184)} =$$

$$= -\frac{1}{9}\int -\frac{\frac{1}{C} - \frac{1}{C-184}}{184}\,dC =$$

$$= \frac{1}{9}\left[\frac{1}{184}\int \frac{1}{C}\,dC - \frac{1}{184}\int \frac{1}{C-184}\,dC\right] =$$

$$= \frac{\ln C}{1656} - \frac{\ln(C-184)}{1656}$$

$$\frac{\ln C}{1656} - \frac{\ln(C-184)}{1656} = \frac{t}{8000} + D_2 \quad / \cdot 1656$$

$$\ln C - \ln(C-184) = 0{,}207t + D_1$$

$$D_1 = D_2 \cdot 1656$$

$$e^{\ln C - \ln(C-184)} = e^{0{,}207t + D_1}$$

$$\frac{C}{C-184} = De^{0{,}207t} \qquad D = e^{D_1}$$

$$C = De^{0{,}207t} \cdot (C-184)$$

$$C = C \cdot De^{0{,}207t} - 184 \cdot De^{0{,}207t}$$

$$C - C \cdot De^{0{,}207t} = -184 \cdot De^{0{,}207t}$$

$$C(1 - De^{0{,}207t}) = -184 \cdot De^{0{,}207t}$$

$$C = \frac{-184 \cdot De^{0{,}207t}}{1 - De^{0{,}207t}} = \frac{184 \cdot De^{0{,}207t}}{De^{0{,}207t} - 1} = \frac{184 \cdot De^{0{,}207t} \overset{=0}{- 184 + 184}}{De^{0{,}207t} - 1} =$$

$$= \frac{184(De^{0{,}207t} - 1) + 184}{De^{0{,}207t} - 1} = \underline{184 + \frac{184}{De^{0{,}207t} - 1}}$$