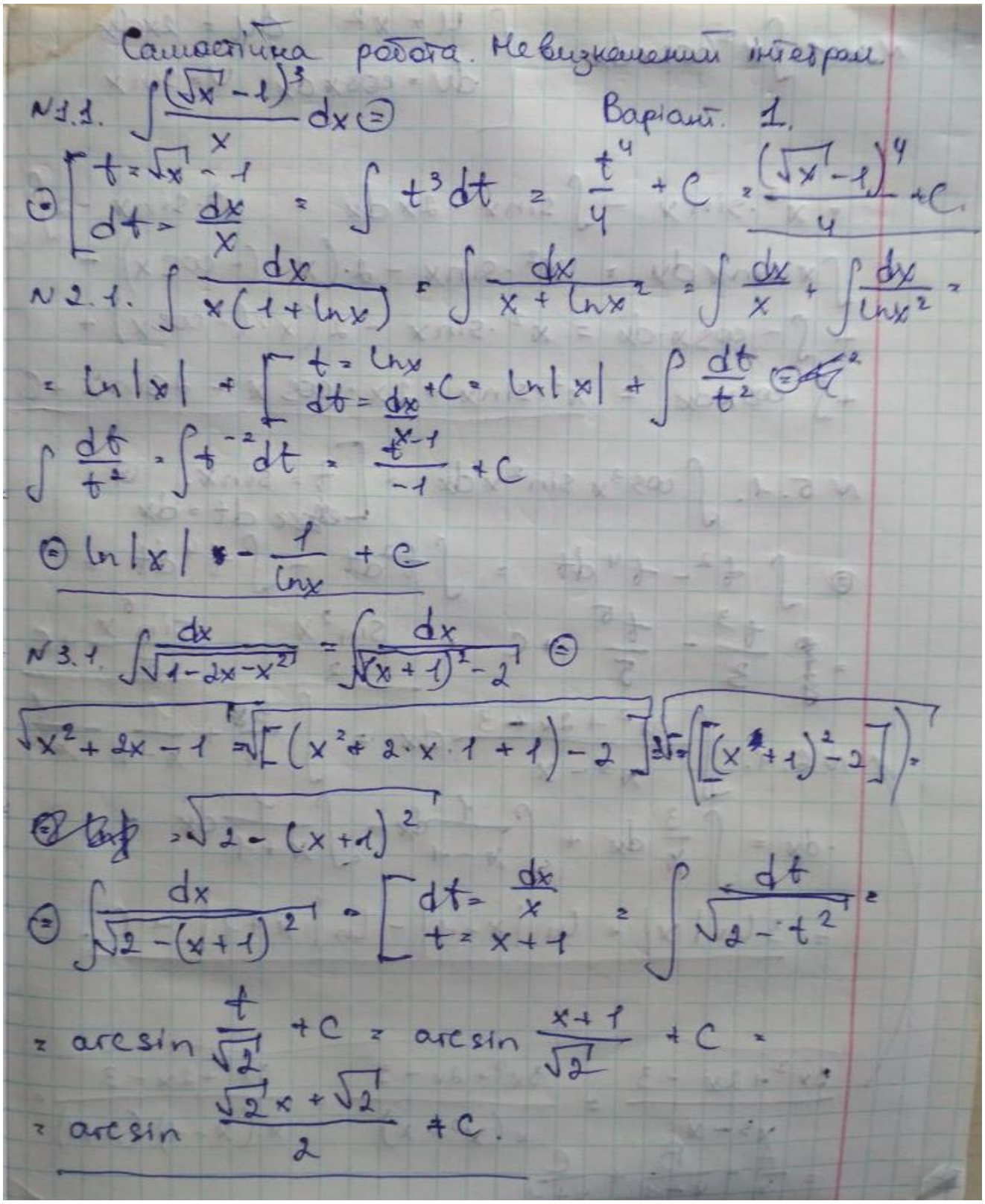
***Самостійна робота. Виконав студент групи ВТ-21-1(1) – Бабушко Андрій.***

***Тема: Невизначений інтеграл.***



N.4.1 $\int x^2 \cos x\,dx$ · $\begin{bmatrix} u = x^2 & du = 2x\,dx \\ dv = \cos x\,dx & v = \sin x \end{bmatrix}$ ·

$= x^2 \cdot \sin x - \int \sin x \cdot 2x\,dx = x^2 \sin x - 2\int x \sin x\,dx = x^2 \cdot \sin x - 2\cdot\left(x\cdot(-\cos x) - \int -\cos x\,dx\right) = x^2 \cdot \sin x - 2\left(x\cdot(-\cos x) + \int \cos x\,dx\right) = \underline{x^2 \cdot \sin x + 2x \cdot \cos x - 2\sin x + C}$

N 5.1. $\int \cos^3 x \sin^2 x\,dx$ · $\begin{bmatrix} t = \sin x & ② \\ dt = dx \end{bmatrix}$

② $\int t^2 - t^4\,dt = \int t^2 dt - \int t^4 dt =$

$= \frac{t^3}{3} - \frac{t^5}{5} + C = \underline{\frac{\sin^3 x}{3} - \frac{\sin^5 x}{5} + C}$

N 6.1. $\int \frac{3x^2 + 2x + 3}{x^3 - x}\,dx = \int \frac{3}{x} + \frac{1}{x-1} - \frac{1}{x+1}$

$\cdot\,dx = \int \frac{3}{x}\,dx + \int \frac{1}{x-1}\,dx - \int \frac{1}{x+1}\,dx =$

$= \underline{3\ln|x| + \ln|x-1| - \ln|x+1| + C.}$

$\frac{3x^2 + 2x - 3}{x^3 - x} = \frac{3x^2 + 2x - 3}{x(x^2 - x)} = \frac{3x^2 + 2x - 3}{x(x-1)(x+1)} =$

$= \frac{A}{x} + \frac{B}{x-1} + \frac{C}{x+1}$

$3x^2 + 2x - 3 = Ax^2 - A + Bx^2 + Bx + Cx^2 - Cx =$

$= x^2(A+B+C) + x(B-C) - A$

$$\begin{cases} -3 = -A \\ 2 = B - C \\ 3 = A + B + C \end{cases} \Rightarrow \begin{cases} A + B + C = 3 \cdot (-1) \\ B - C = 2 \\ A = 3 \end{cases} \leftarrow =$$

$$= \begin{cases} A + B + C = 3 \\ C + C = 2 \\ A = 3 \end{cases} \quad \begin{cases} A + B + C = 3 \\ C = -1 \\ A = 3 \end{cases} \Rightarrow$$

$\rightarrow 3 + B - 1 = 3 \quad B = 1$

$A = 3 \quad B = 1 \quad C = -1$

$$\frac{3}{x} + \frac{1}{x-1} - \frac{1}{x+1}$$