Informatikos fakultetas

MATEMATIKA 2

Namų darbas Nr.1

Variantas Nr. 18

Atliko:

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Priėmė: dėst. Liepa Bikulčienė

KAUNAS, 2022

Darbo užduotis:

18 variantas

Užduotis:

1. Raskite kompleksinio skaičiaus realiąją ir menamąją dalis.
2. Parašykite kompleksinį skaičių $z = x + iy$ trigonometrine ir rodikline forma; apskaičiuokite jo n-ąjį laipsnį.
3. Raskite kompleksinio skaičiaus šaknies visas reikšmes ir pavaizduokite jas geometriškai.
4. Išspręskite lygtį.
5. – 16. Apskaičiuokite neapibrėžtinius integralus.

Visų šių uždavinių patikrinimą atlikite su Octave / Matlab (ar Mathcad) programine įranga.
Jei naudosite kitą programinę įrangą, nurodykite – kokią (pateikite internetinę nuorodą ir pavadinimą).

Prie kiekvieno uždavinio pateikite (priklijuokite) atspausdintą sprendimą.

1.	$z = \bar{z}_1 \cdot z_2 + \frac{29z_1}{z_2} - i^{37}, z_1 = 5 - 2i, z_2 = -2 + 5i$	**9.**	$\int \frac{\cos(1 - 2\ln 3x)}{x} dx$
2.	$z = \sqrt{2} - \sqrt{2}\,i,\ n = 5$	**10.**	$\int \frac{x\,dx}{\sqrt{9 - 16x^4}}$
3.	$\sqrt[4]{81i}$	**11.**	$\int \frac{\cos(1 - 3x)}{4 + \sin^2(1 - 3x)} dx$
4.	$4z^2 - 32z + 65 = 0$	**12.**	$\int \frac{3x^2 - 5}{x - 4} dx$
5.	$\int \frac{\left(1 + \sqrt[3]{x}\right)^2}{\sqrt{x}} dx$	**13.**	$\int \frac{8x + 5}{\sqrt{4x^2 + 20x + 29}} dx$
6.	$\int \frac{dx}{e^{1-9x}}$	**14.**	$\int \frac{x - 7}{x^2 + 12x + 37} dx$
7.	$\int \frac{x\,dx}{\cos^2\left(3 - 8x^2\right)}$	**15.**	$\int x \cdot \arcsin x^2\, dx$
8.	$\int x^5 \cdot \sqrt[7]{\left(2 - 3x^6\right)^3} dx$	**16.**	$\int \left(3x^2 - x + 2\right) \cdot e^{3x} dx$

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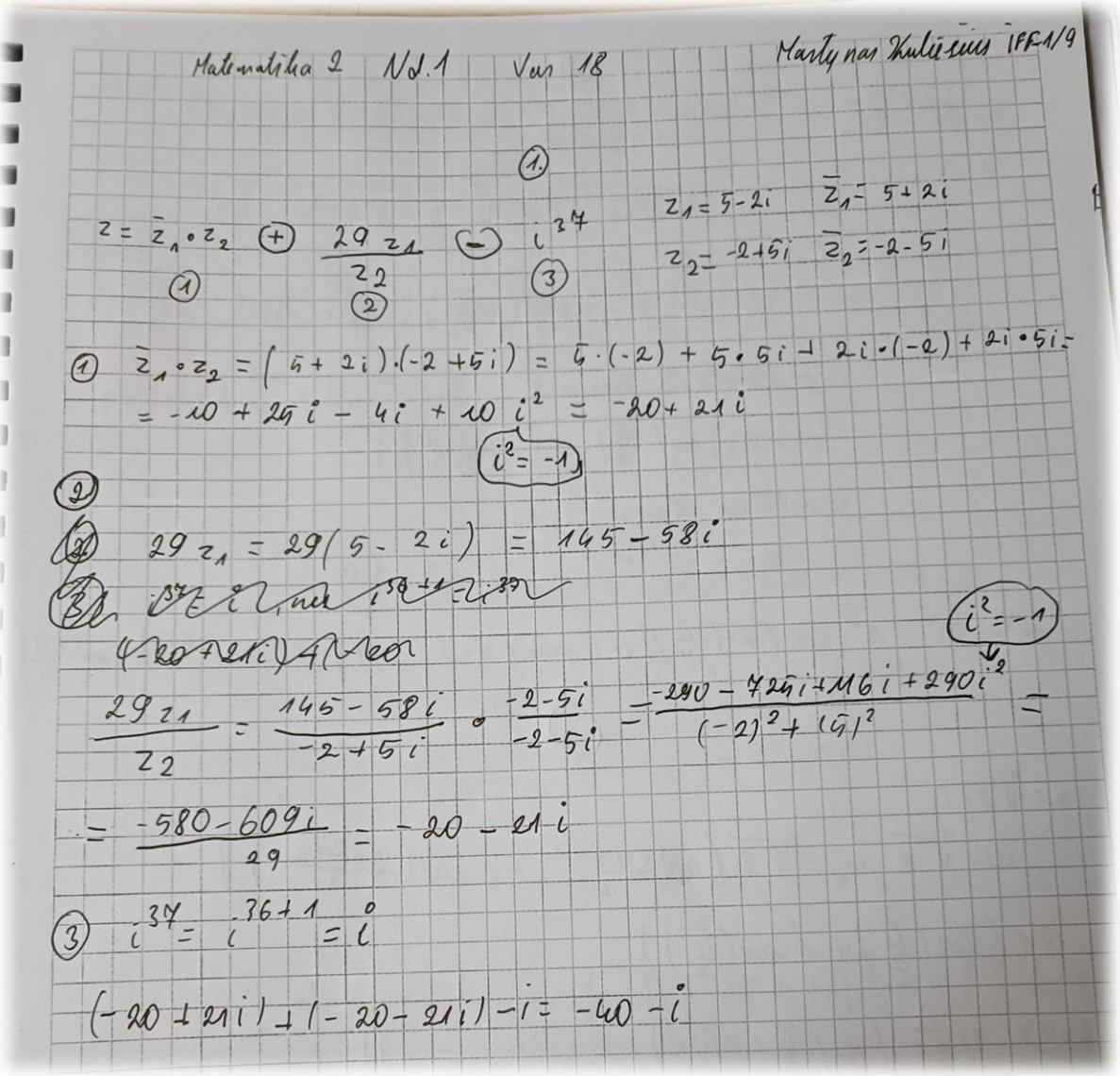
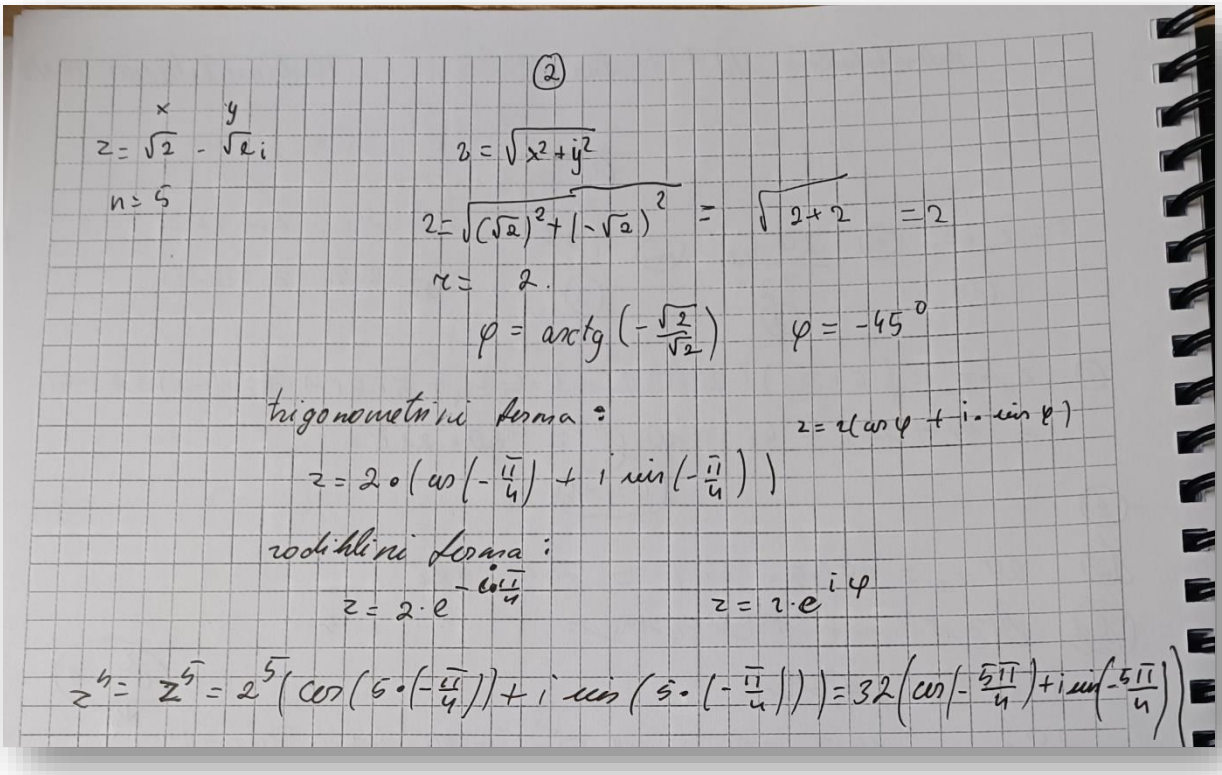
1.



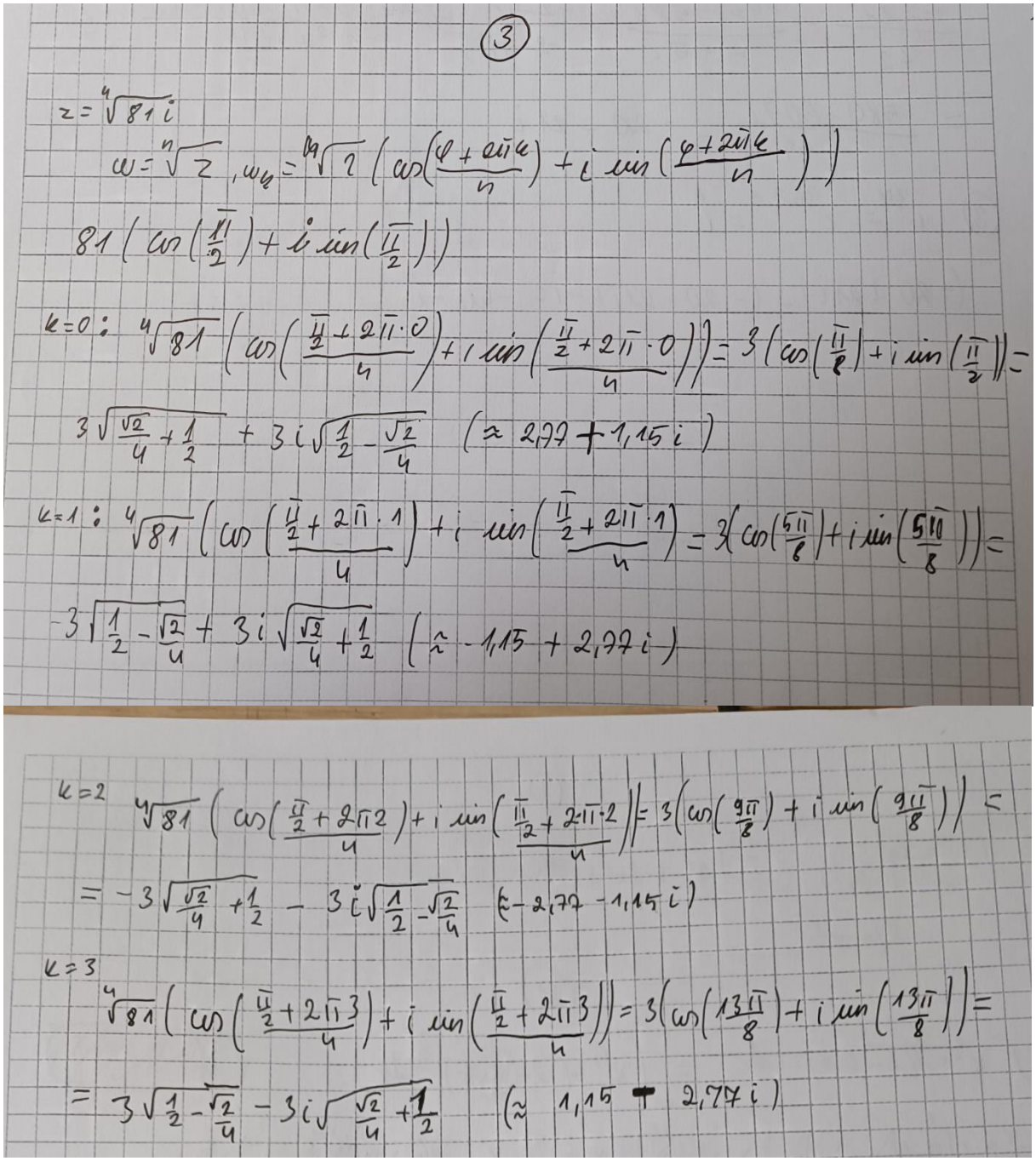

```
octave:6> z1=5-2i
z1 =  5 - 2i
octave:7> z1n=5+2i
z1n =  5 + 2i
octave:8> z2=-2+5i
z2 = -2 + 5i
octave:9> z=z1n*z2+((29*z1)/z2)-i^37
z = -40 -  1i
```

2.



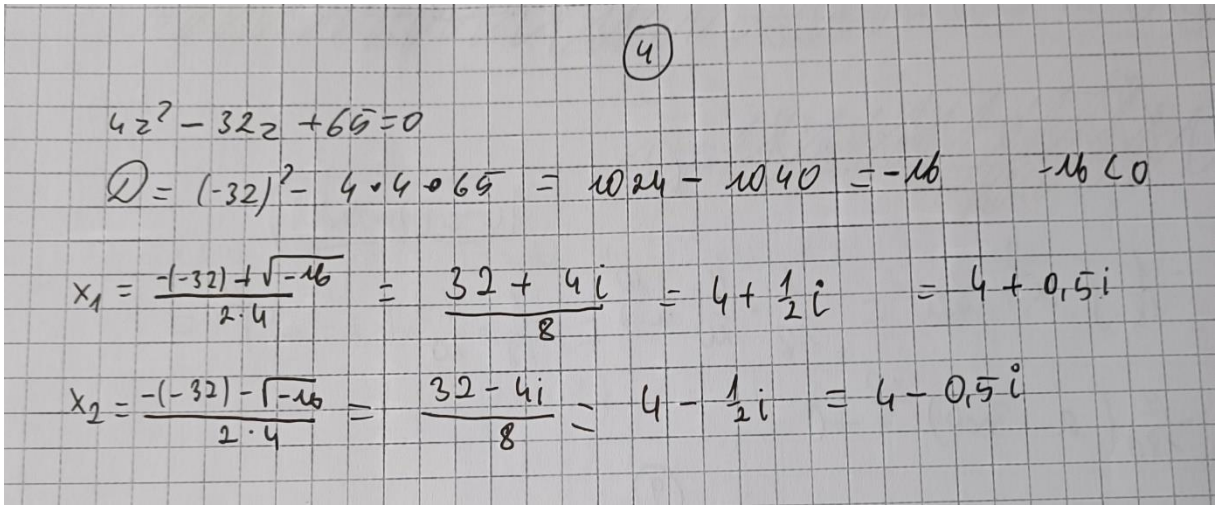

```
octave:13> z=sqrt(2)-sqrt(2)*i
z =  1.4142 - 1.4142i
octave:14> z^5
ans = -22.627 + 22.627i
```

3.



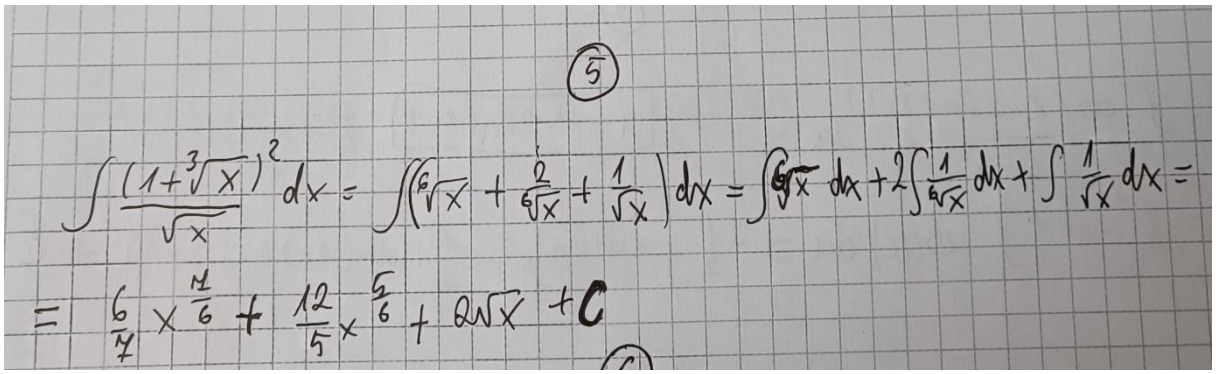
Nežinau kaip pavaizduoti reikia..

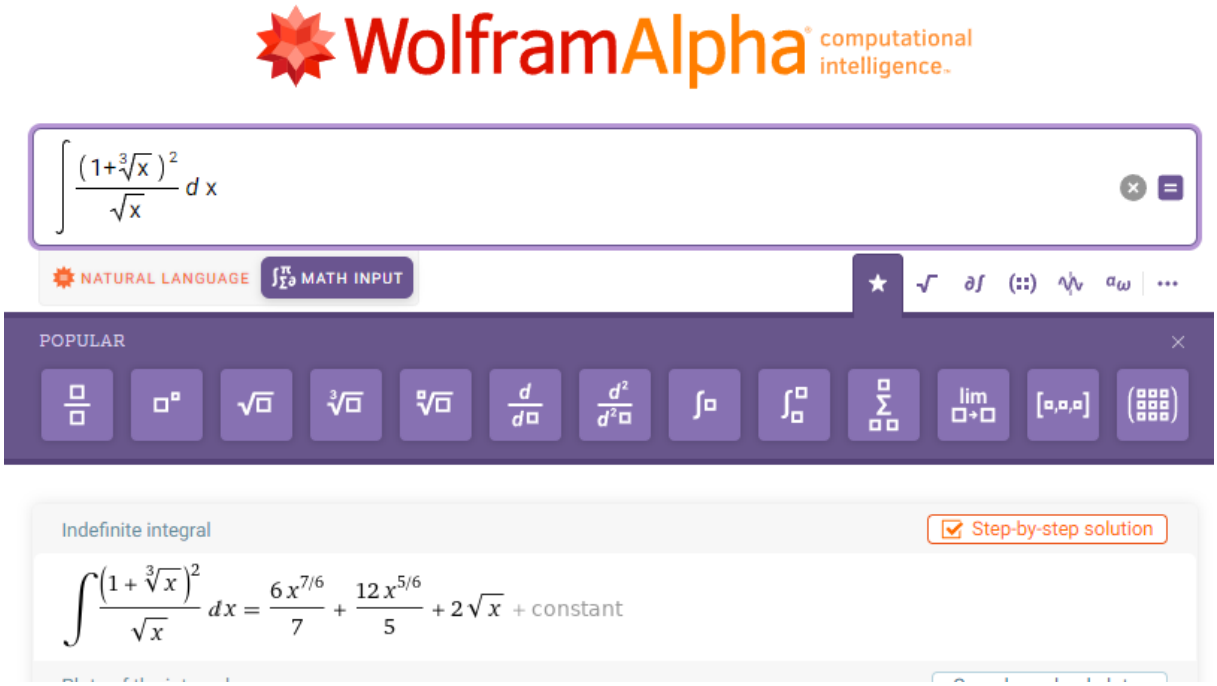
4.



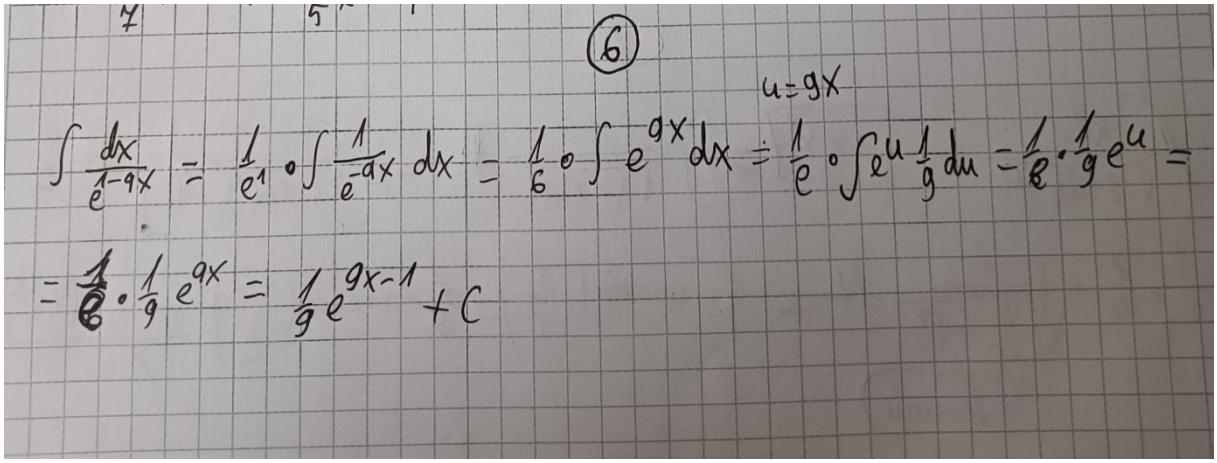
Octave nenori skaičiuoti šitos užduoties

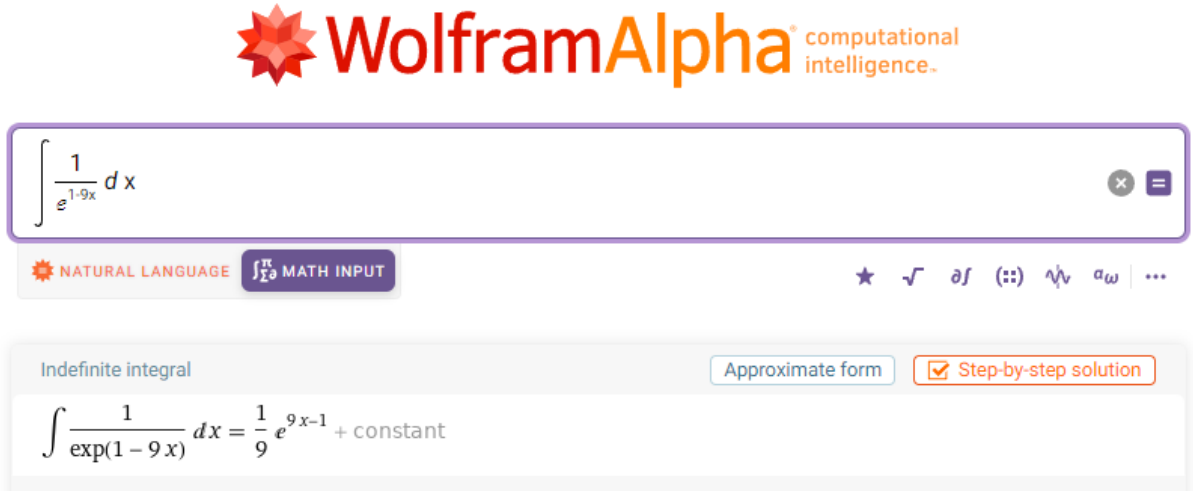
5.


5
$\int \frac{(1+\sqrt[3]{x})^2}{\sqrt{x}} dx = \int \left(\frac{1}{\sqrt{x}} + \frac{2}{\sqrt[6]{x}} + \frac{1}{\sqrt{x}}\right) dx = \int \sqrt[6]{x}\, dx + 2\int \frac{1}{\sqrt[6]{x}} dx + \int \frac{1}{\sqrt{x}} dx =$
$= \frac{6}{7} \times \frac{7}{6} + \frac{12}{5} \times \frac{5}{6} + 2\sqrt{x} + C$

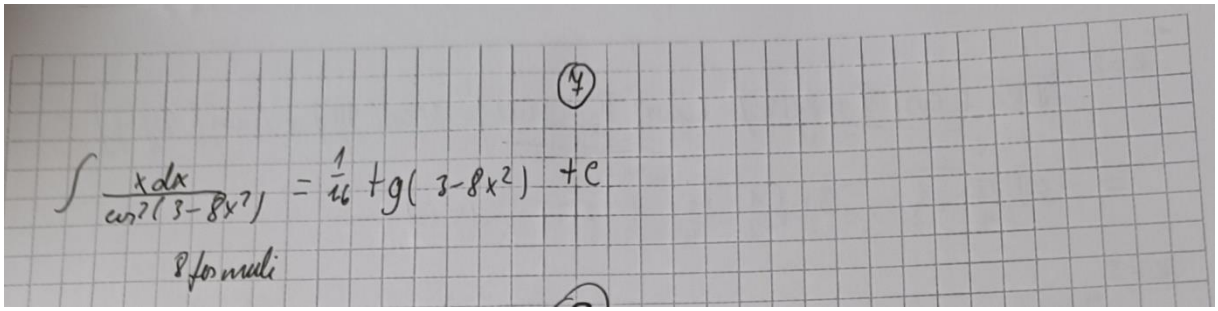

WolframAlpha computational intelligence
$\int \frac{(1+\sqrt[3]{x})^2}{\sqrt{x}} dx$
NATURAL LANGUAGE
MATH INPUT
POPULAR
Indefinite integral
Step-by-step solution
$\int \frac{\left(1+\sqrt[3]{x}\right)^2}{\sqrt{x}} dx = \frac{6x^{7/6}}{7} + \frac{12x^{5/6}}{5} + 2\sqrt{x}$ + constant

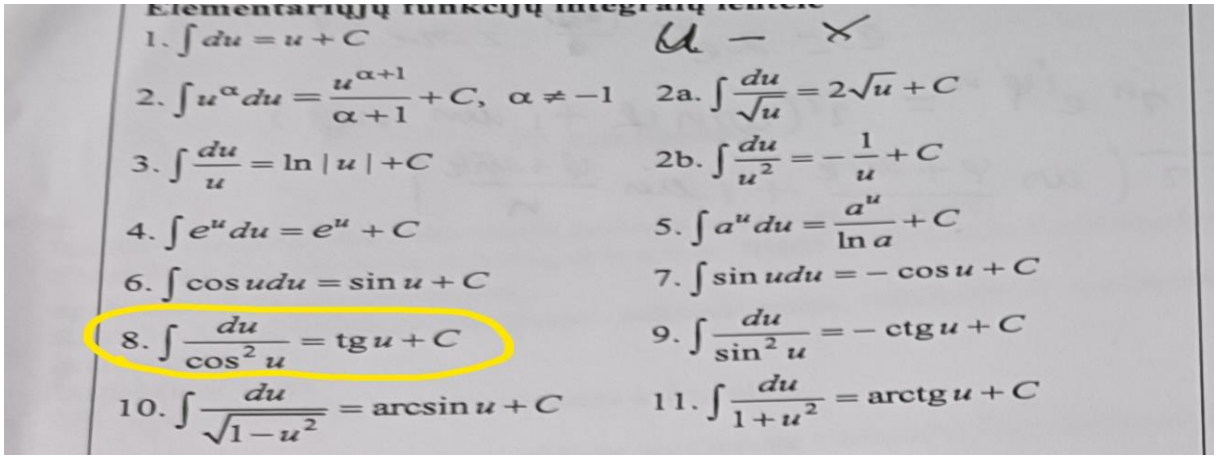
6.


6
u=9x
$\int \frac{dx}{e^{1-9x}} = \frac{1}{e^1} \cdot \int \frac{1}{e^{-9x}} dx = \frac{1}{e} \cdot \int e^{9x} dx = \frac{1}{e} \cdot \int e^u \frac{1}{9} du = \frac{1}{e} \cdot \frac{1}{9} e^u =$
$= \frac{1}{e} \cdot \frac{1}{9} e^{9x} = \frac{1}{9} e^{9x-1} + C$


WolframAlpha computational intelligence
$\int \frac{1}{e^{1-9x}} dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Approximate form
Step-by-step solution
$\int \frac{1}{\exp(1-9x)} dx = \frac{1}{9} e^{9x-1}$ + constant

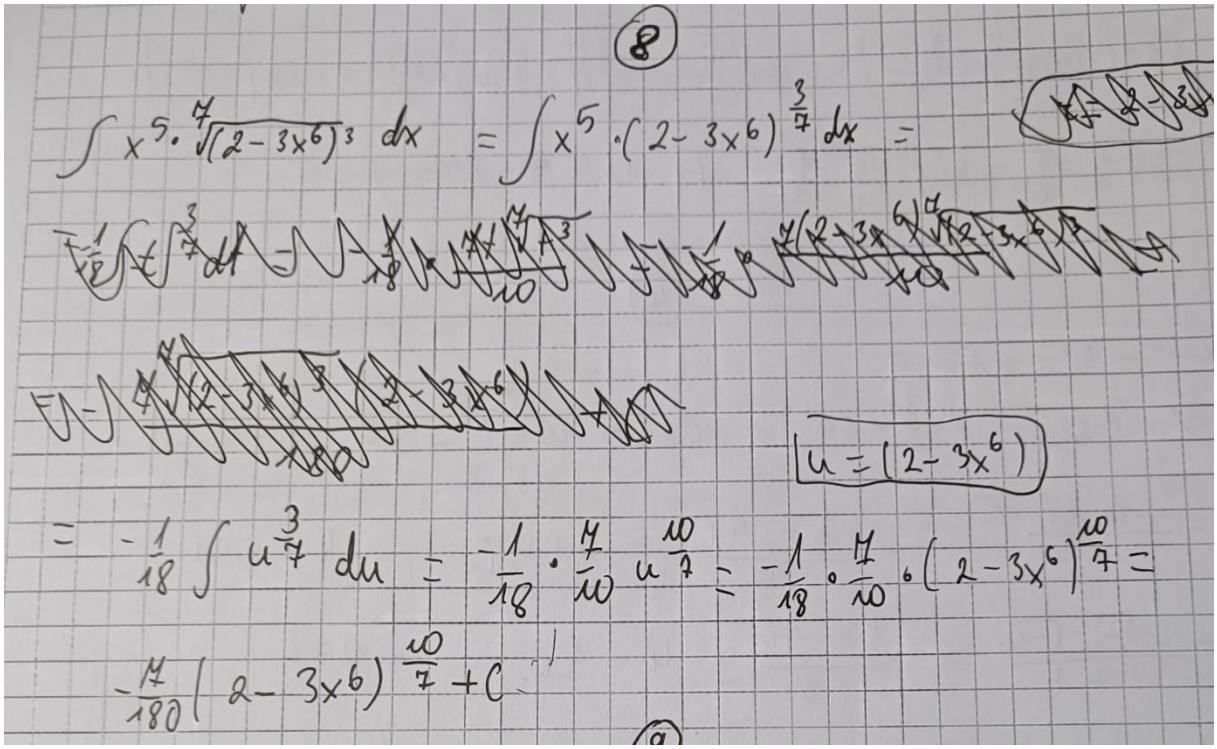
7.

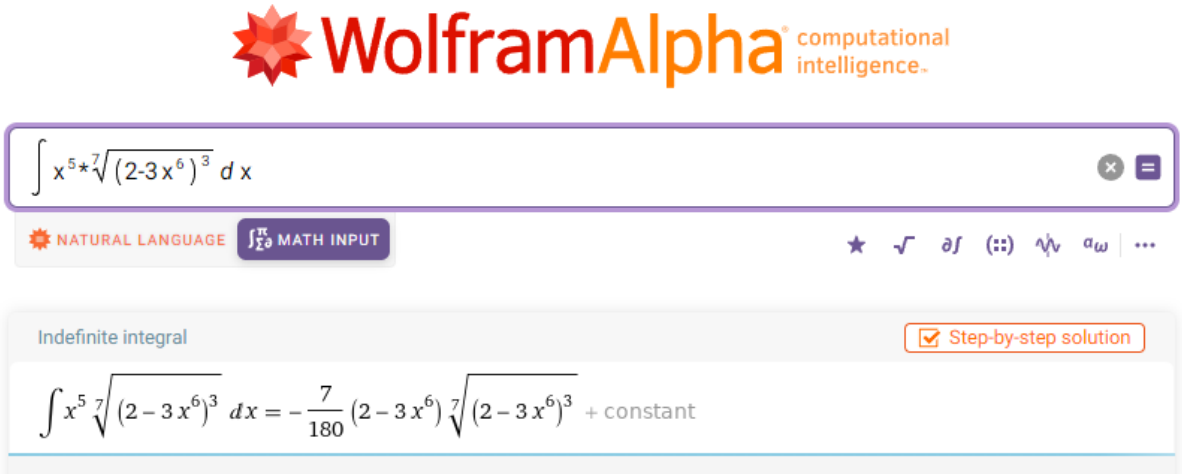

(7)
$\int \frac{x\,dx}{\cos^2(3-8x^2)} = \frac{1}{16} tg(3-8x^2) + C$
8 formuli


1. $\int du = u + C$
2. $\int u^\alpha du = \frac{u^{\alpha+1}}{\alpha+1} + C, \quad \alpha \neq -1$
2a. $\int \frac{du}{\sqrt{u}} = 2\sqrt{u} + C$
3. $\int \frac{du}{u} = \ln|u| + C$
2b. $\int \frac{du}{u^2} = -\frac{1}{u} + C$
4. $\int e^u du = e^u + C$
5. $\int a^u du = \frac{a^u}{\ln a} + C$
6. $\int \cos u du = \sin u + C$
7. $\int \sin u du = -\cos u + C$
8. $\int \frac{du}{\cos^2 u} = \operatorname{tg} u + C$
9. $\int \frac{du}{\sin^2 u} = -\operatorname{ctg} u + C$
10. $\int \frac{du}{\sqrt{1-u^2}} = \arcsin u + C$
11. $\int \frac{du}{1+u^2} = \operatorname{arctg} u + C$

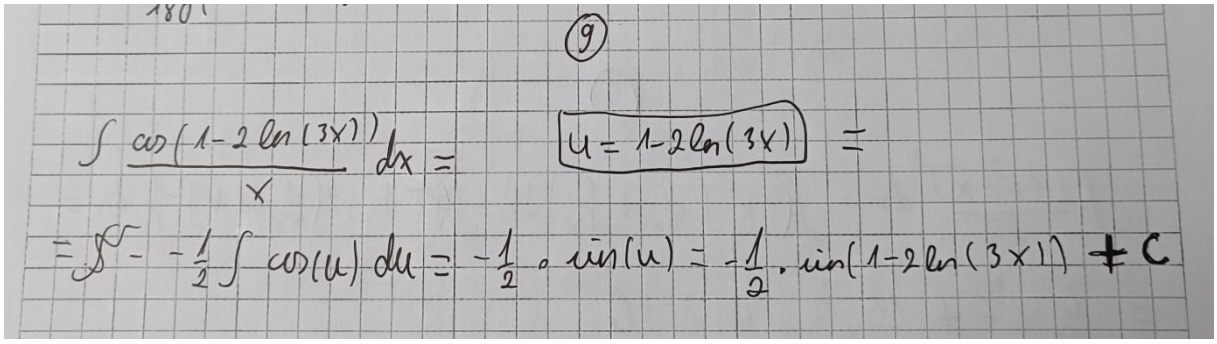

WolframAlpha computational intelligence
$\int \frac{x}{(\cos(3\text{-}8x^2))^2}\,dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Step-by-step solution
$\int \frac{x}{\cos^2(3-8x^2)}\,dx = -\frac{1}{16}\tan(3-8x^2)$ + constant

8.


8
$\int x^5 \cdot \sqrt[7]{(2-3x^6)^3}\,dx = \int x^5 \cdot (2-3x^6)^{\frac{3}{7}}\,dx =$
$u = (2-3x^6)$
$= -\frac{1}{18}\int u^{\frac{3}{7}}\,du = -\frac{1}{18}\cdot\frac{7}{10}u^{\frac{10}{7}} = -\frac{1}{18}\cdot\frac{7}{10}\cdot(2-3x^6)^{\frac{10}{7}} =$
$-\frac{7}{180}(2-3x^6)^{\frac{10}{7}} + C$


WolframAlpha computational intelligence
$\int x^5 * \sqrt[7]{(2-3x^6)^3}\,dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Step-by-step solution
$\int x^5 \sqrt[7]{(2-3x^6)^3}\,dx = -\frac{7}{180}(2-3x^6)\sqrt[7]{(2-3x^6)^3}$ + constant

9.



WolframAlpha computational intelligence

$$\int \frac{\cos(1-2\ln(3x))}{x}\,dx$$

NATURAL LANGUAGE | MATH INPUT

Indefinite integral

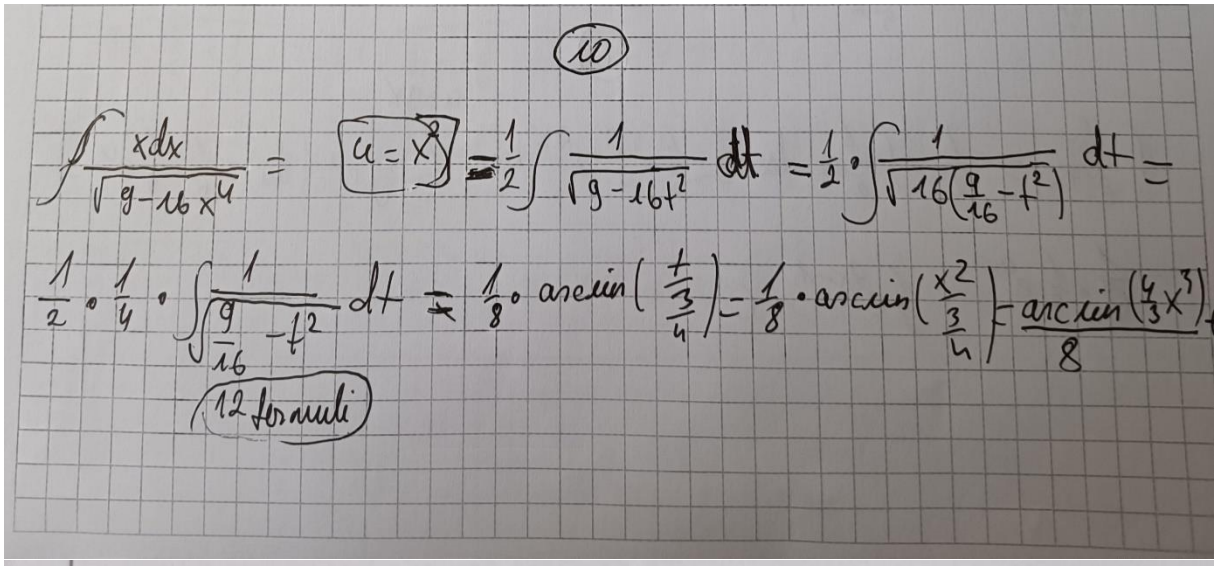
Step-by-step solution

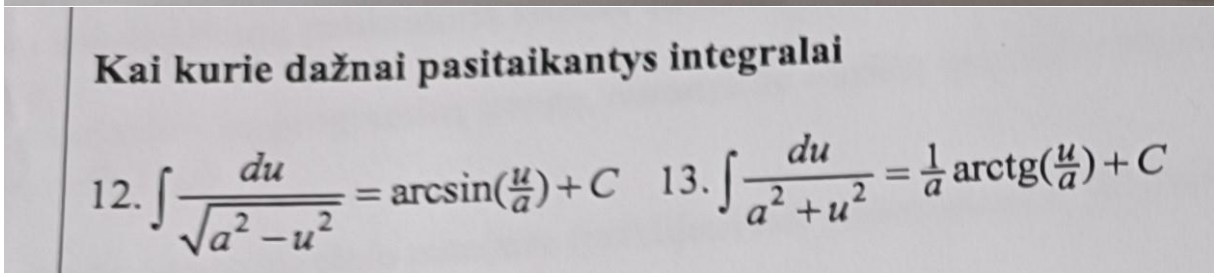
$$\int \frac{\cos(1-2\log(3x))}{x}\,dx = -\frac{1}{2}\sin(1-2\log(3x)) + \text{constant}$$

(assuming a complex-valued logarithm)

$\log(x)$ is the natural logarithm

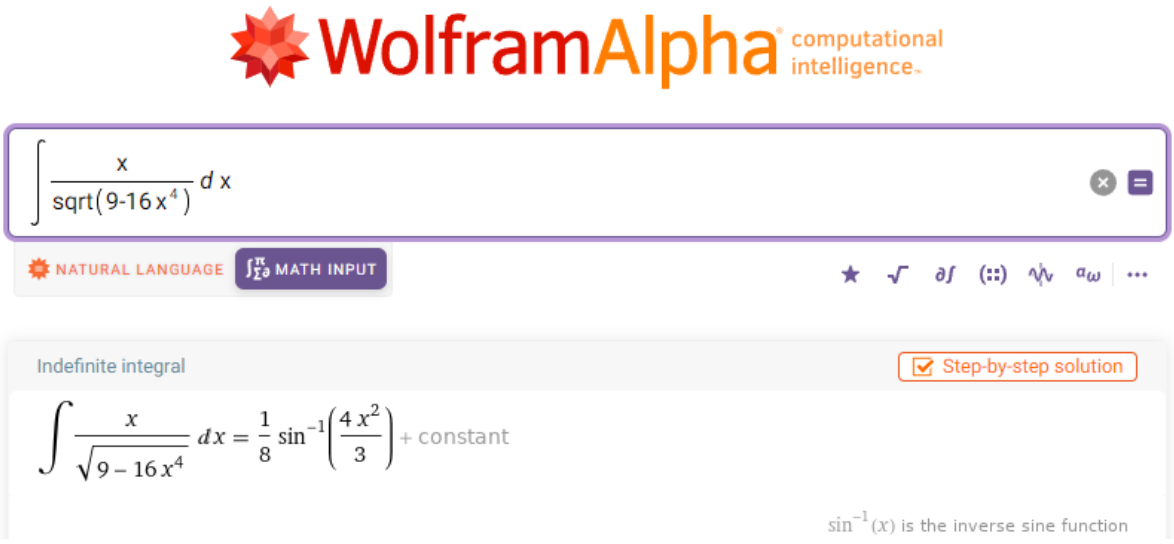
10.



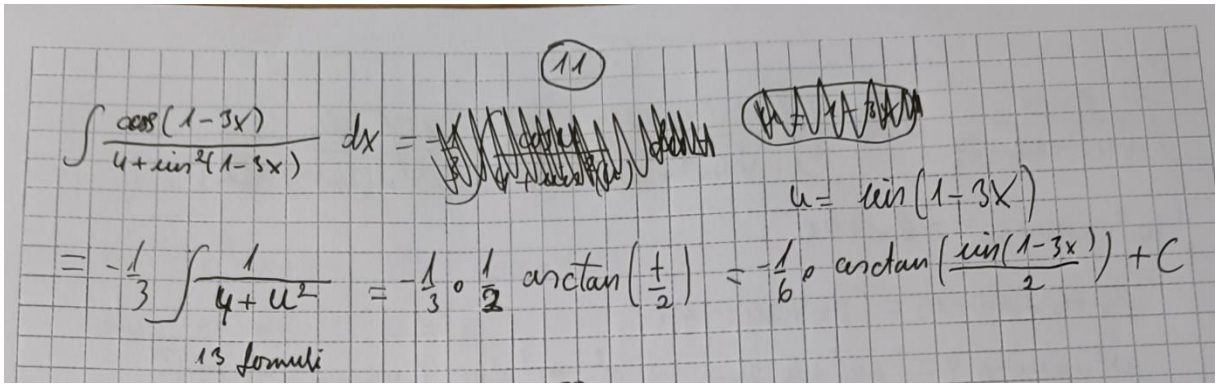


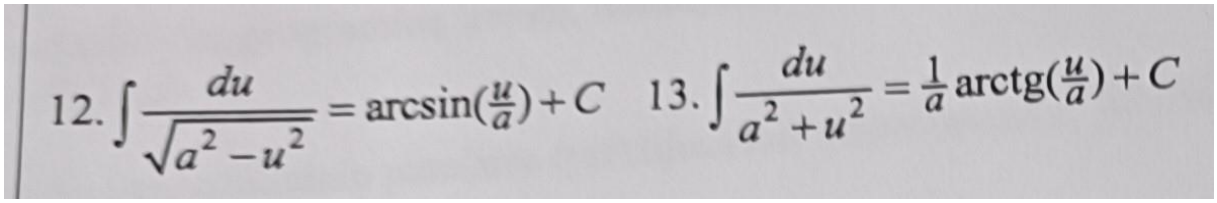
Kai kurie dažnai pasitaikantys integralai

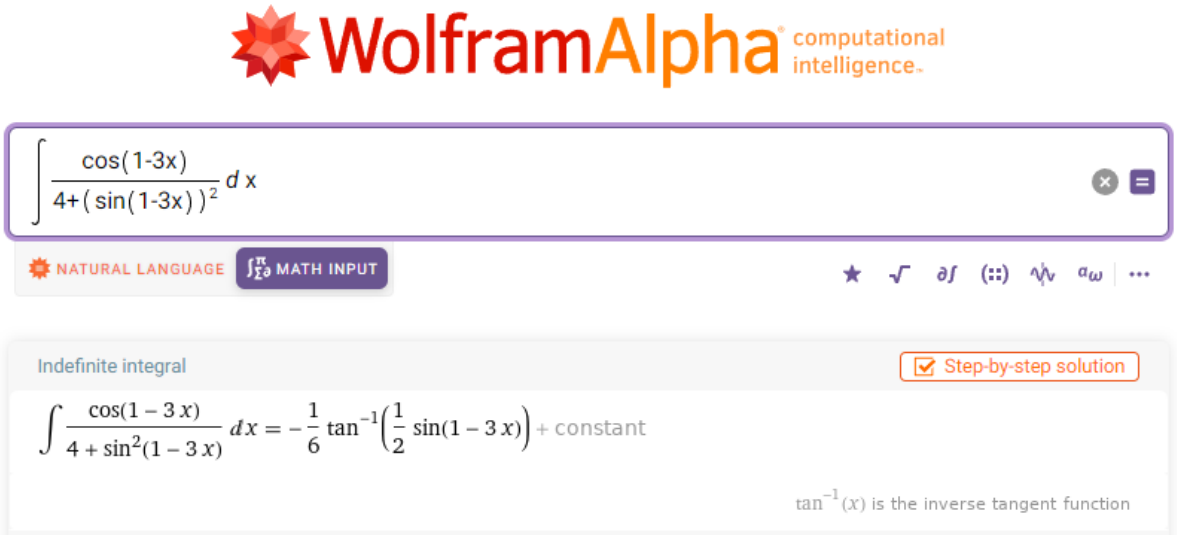
12. $\int \frac{du}{\sqrt{a^2-u^2}} = \arcsin\left(\frac{u}{a}\right)+C$ 13. $\int \frac{du}{a^2+u^2} = \frac{1}{a}\operatorname{arctg}\left(\frac{u}{a}\right)+C$



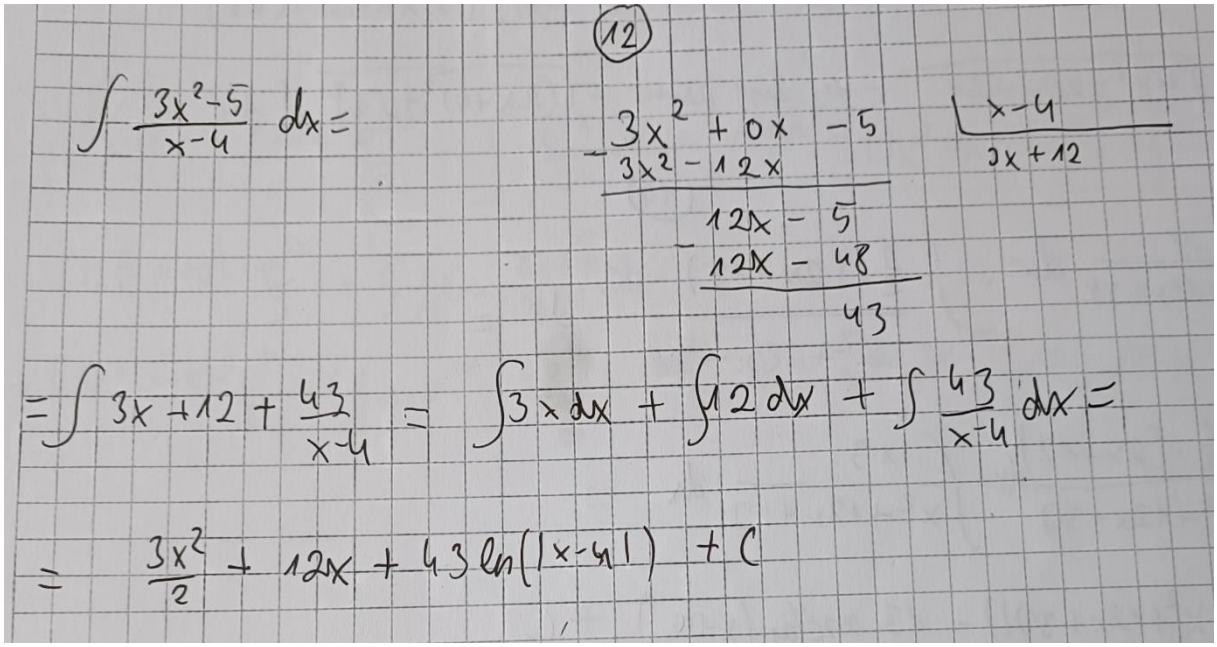
11.

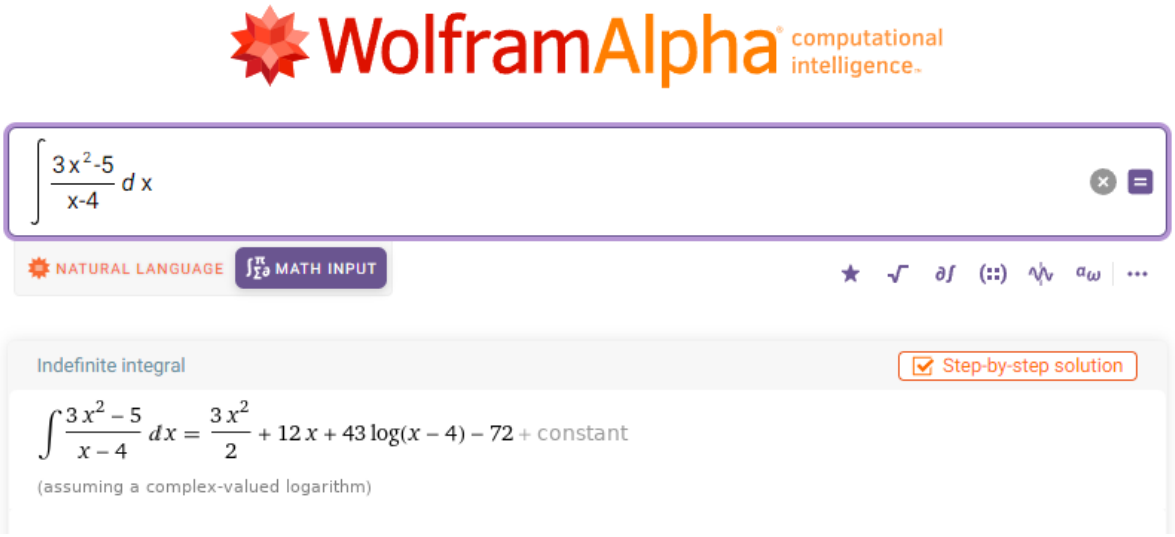

11
$\int \frac{\cos(1-3x)}{4+\sin^2(1-3x)}\,dx = -\frac{1}{3}\int \frac{1}{4+u^2}$
$u = \sin(1-3x)$
13 formulė
$= -\frac{1}{3}\cdot\frac{1}{2}\arctan\left(\frac{t}{2}\right) = -\frac{1}{6}\cdot\arctan\left(\frac{\sin(1-3x)}{2}\right)+C$


12. $\int \frac{du}{\sqrt{a^2-u^2}} = \arcsin\left(\frac{u}{a}\right)+C$
13. $\int \frac{du}{a^2+u^2} = \frac{1}{a}\operatorname{arctg}\left(\frac{u}{a}\right)+C$

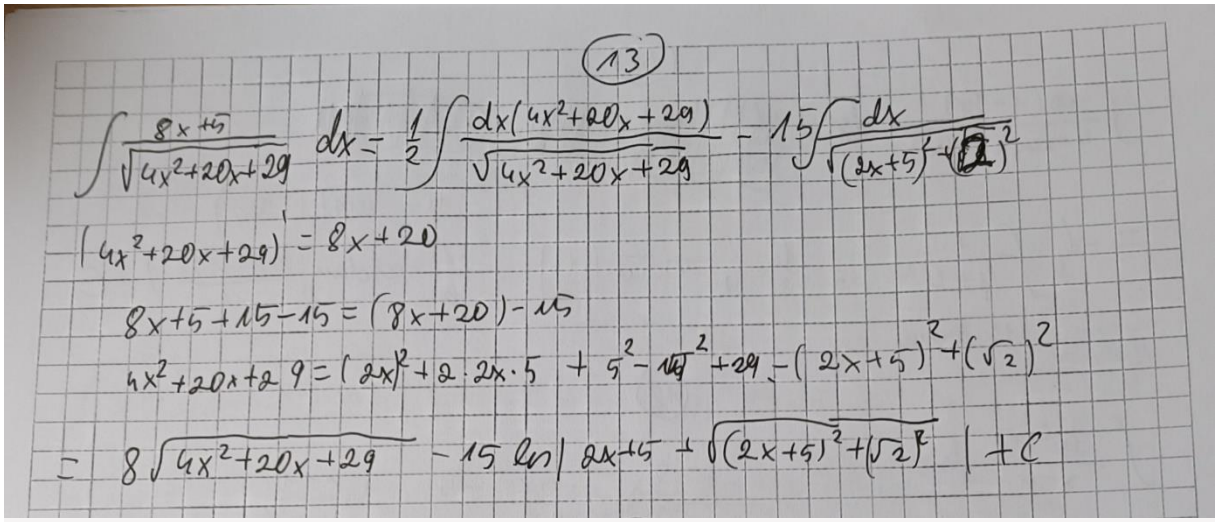

WolframAlpha computational intelligence.
$\int \frac{\cos(1-3x)}{4+(\sin(1-3x))^2}\,dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Step-by-step solution
$\int \frac{\cos(1-3x)}{4+\sin^2(1-3x)}\,dx = -\frac{1}{6}\tan^{-1}\left(\frac{1}{2}\sin(1-3x)\right)$ + constant
$\tan^{-1}(x)$ is the inverse tangent function

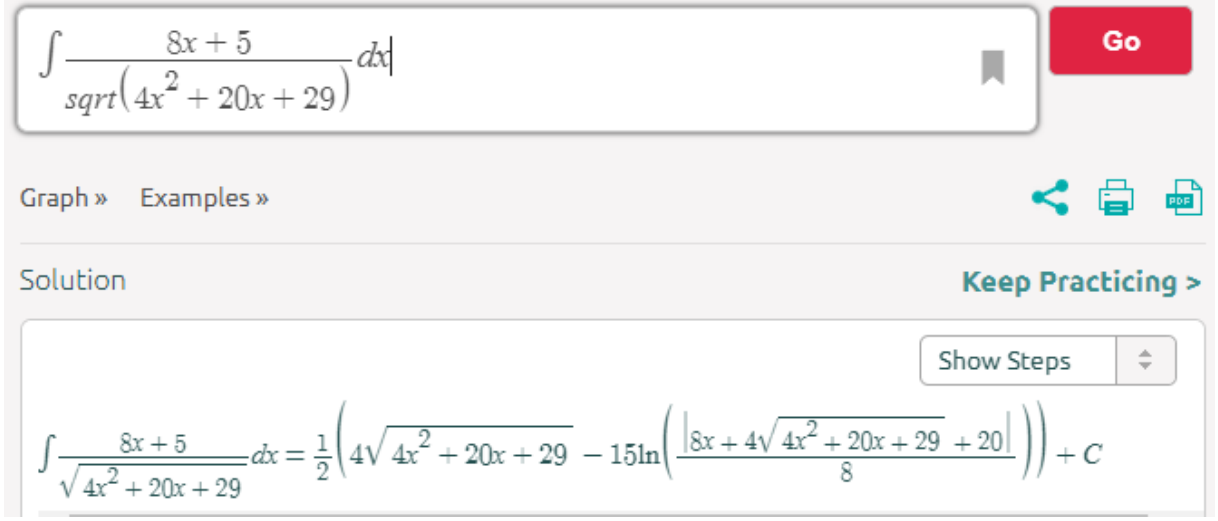
12.

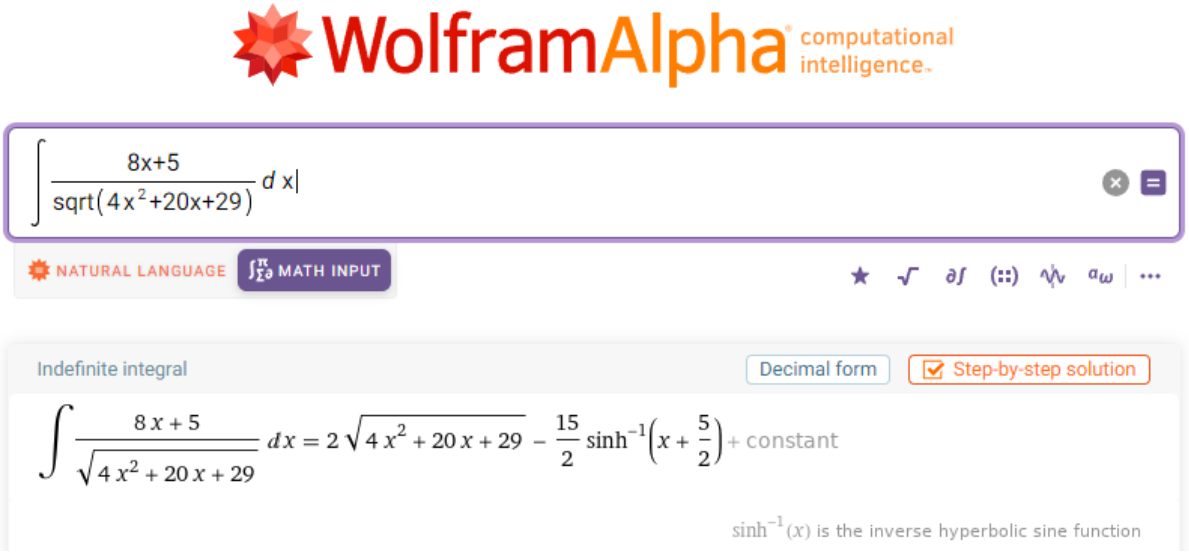

12
$\int \frac{3x^2-5}{x-4}\,dx =$
$-3x^2 + 0x - 5 \quad | \; x-4$
$3x^2 - 12x \quad\quad 3x + 12$
$12x - 5$
$12x - 48$
43
$= \int 3x + 12 + \frac{43}{x-4} = \int 3x\,dx + \int 12\,dx + \int \frac{43}{x-4}\,dx =$
$= \frac{3x^2}{2} + 12x + 43\ln(|x-4|) + C$


WolframAlpha computational intelligence
$\int \frac{3x^2-5}{x-4}\,dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Step-by-step solution
$\int \frac{3x^2-5}{x-4}\,dx = \frac{3x^2}{2} + 12x + 43\log(x-4) - 72$ + constant
(assuming a complex-valued logarithm)

13.

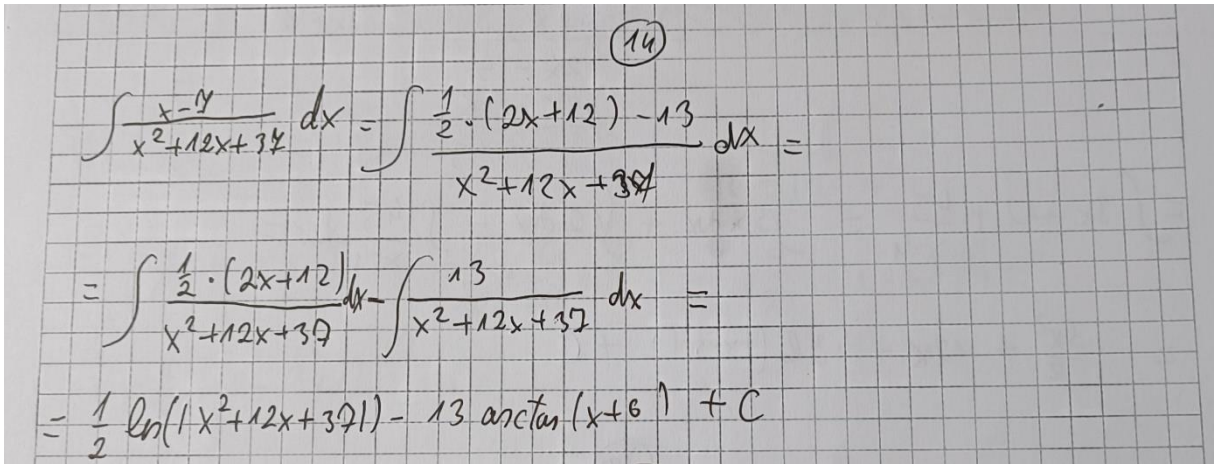






Dvi skaičiuoklės skirtingus atsakymus gavo

14.



WolframAlpha computational intelligence

$$\int \frac{x-7}{x^2+12x+37}\,dx$$

NATURAL LANGUAGE | MATH INPUT

Indefinite integral

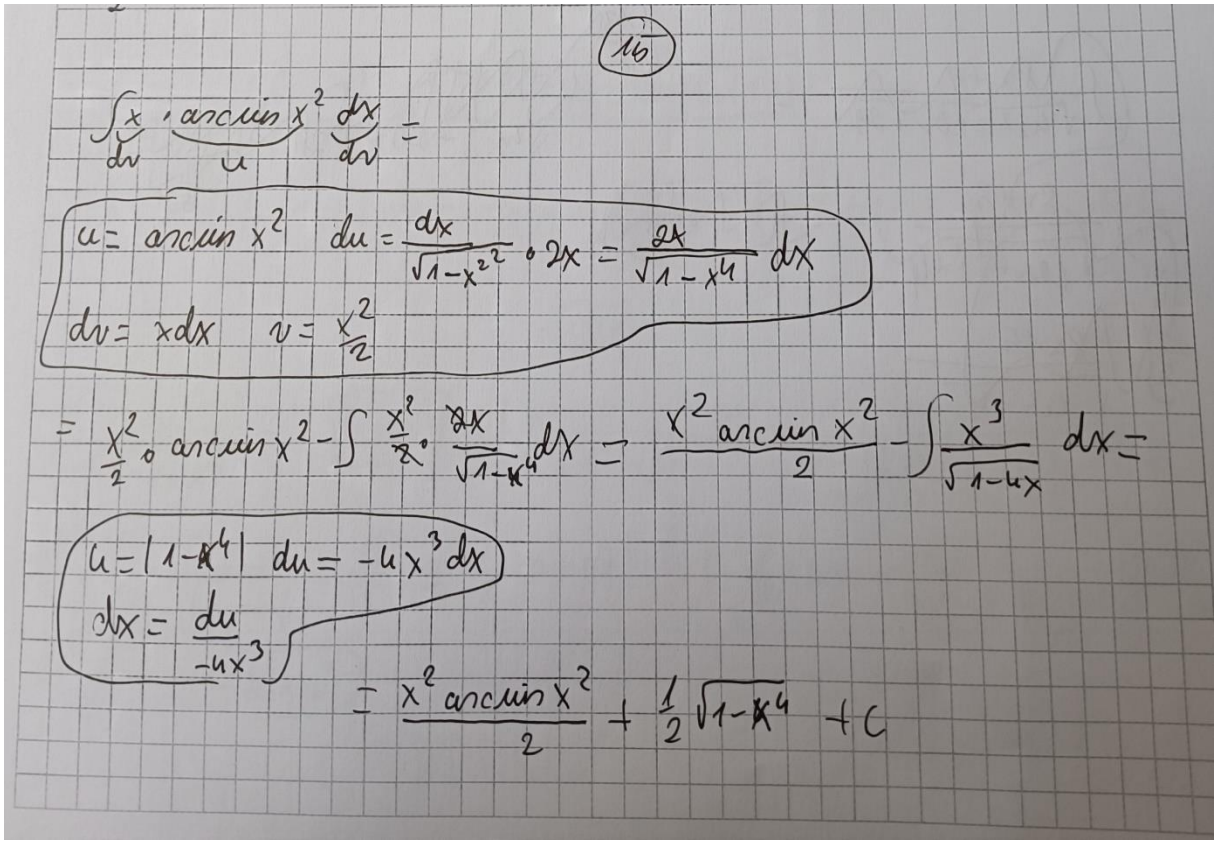
Step-by-step solution

$$\int \frac{x-7}{x^2+12x+37}\,dx = \frac{1}{2}\log(x^2+12x+37) - 13\tan^{-1}(x+6) + \text{constant}$$

$\tan^{-1}(x)$ is the inverse tangent function

$\log(x)$ is the natural logarithm

15.



WolframAlpha computational intelligence.

$\int x*\arcsin(x^2)\, dx$

NATURAL LANGUAGE | MATH INPUT

Indefinite integral

Step-by-step solution

$$\int x \sin^{-1}(x^2)\, dx = \frac{1}{2}\left(\sqrt{1-x^4} + x^2 \sin^{-1}(x^2)\right) + \text{constant}$$

$\sin^{-1}(x)$ is the inverse sine function

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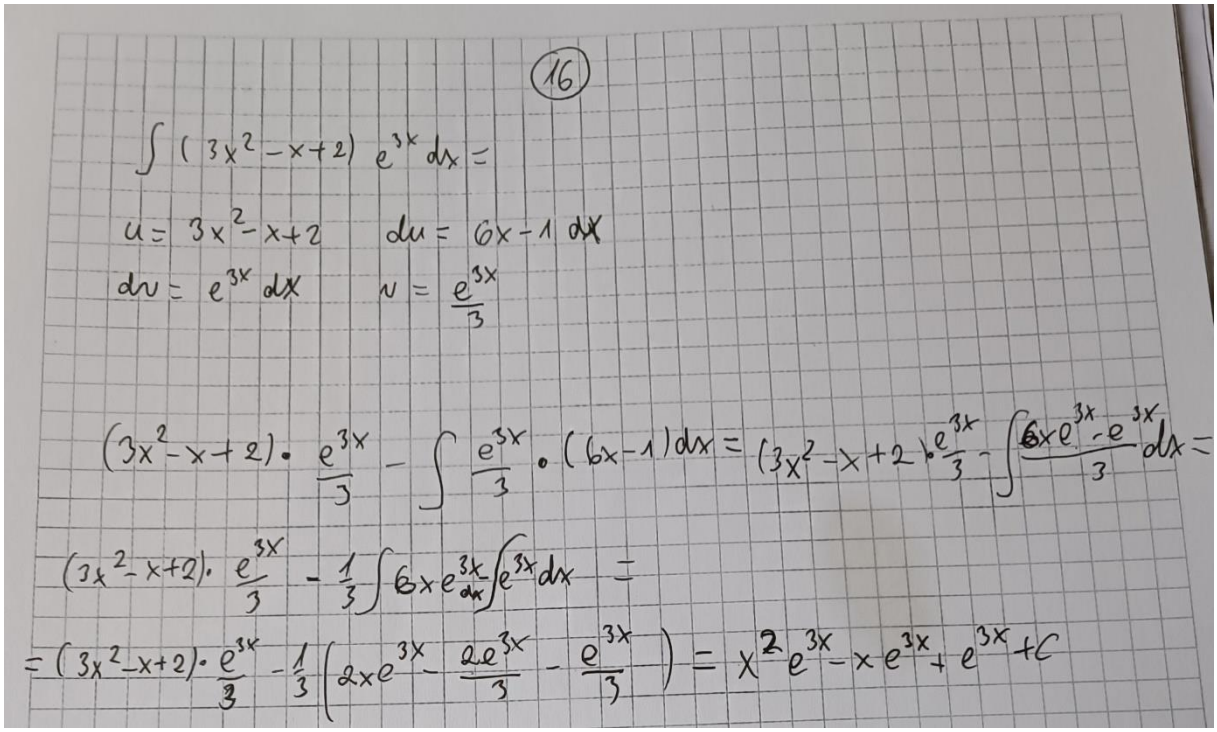
16.


16
$\int (3x^2-x+2)\, e^{3x}\, dx =$
$u = 3x^2-x+2 \quad du = 6x-1\, dx$
$dv = e^{3x}\, dx \quad v = \frac{e^{3x}}{3}$
$(3x^2-x+2)\cdot \frac{e^{3x}}{3} - \int \frac{e^{3x}}{3}\cdot(6x-1)\,dx = (3x^2-x+2)\cdot\frac{e^{3x}}{3} - \int \frac{6xe^{3x}-e^{3x}}{3}\,dx =$
$(3x^2-x+2)\cdot\frac{e^{3x}}{3} - \frac{1}{3}\int 6x e^{3x}\,dx \int e^{3x}\,dx =$
$= (3x^2-x+2)\cdot\frac{e^{3x}}{3} - \frac{1}{3}\left(2xe^{3x} - \frac{2e^{3x}}{3} - \frac{e^{3x}}{3}\right) = x^2e^{3x} - xe^{3x} + e^{3x} + C$


WolframAlpha computational intelligence.
$\int (3x^2-x+2)*e^{3x}\, dx$
NATURAL LANGUAGE
MATH INPUT
Indefinite integral
Approximate form
Step-by-step solution
$\int (3x^2-x+2)\, e^{3x}\, dx = e^{3x}(x^2-x+1)$ + constant

Informacijos šaltiniai ir pagalbinės programos:

Octave internetinė skaičiuoklė
https://octave-online.net/

WolframAlpha internetinė skaičiuoklė
https://www.wolframalpha.com/

Symbolab internetinė skaičiuoklė
https://www.symbolab.com/

Matematikos formulynas, suteiktas dėstytojos

Indų matematiniai video įrašai Youtube