cell array of integrals

```
[I Inew f fnew F Fanti] = deal(cell(101,1));
[U Iu Iunew fu funew Fu Funew] = deal(I);
[V Iv Ivnew fv fvnew Fv Fvnew] = deal(I);
[W Iw Iwnew fw fwnew Fw Fwnew] = deal(I);
[T It Itnew ft ftnew Ft Ftnew] = deal(I);
[Iunewsum Ivsumnew Iwsumnew] = deal(I);
[dV Ibp] = deal(I);
[dV2 Ibp2] = deal(I);
Ibpnew = I;
Iubp = I;
[Isum Isumr Iusum Iusumr Ivsum Ivsumr] = deal(I);
[If Ifr dIf dIfr d2If d2Ifr] = deal(I);
[Ifu Ifur dIfu dIfur d2Ifu d2Ifur] = deal(I);
[Ifsum Ifsumr dIfsum dIfsumr d2Ifsum d2Ifsumr] = deal(I);
[Ifusum Ifusumr dIfusum dIfusumr] = deal(I);
[Imaz Iumaz Ivmaz Iwmaz Itmaz] = deal(I);
[Fmaz Fumaz Fvmaz Fwmaz Ftmaz] = deal(I);
[fmaz fumaz fvmaz fwmaz ftmaz] = deal(I);
[even odd Amaz Bmaz] = deal(I);
[Ixyz Fxyz fxyz] = deal(I);
[Iyz Fyz fyz] = deal(I);
[Iy Fy fy] = deal(I);
[Ixy Fxy fxy] = deal(I);
syms x y z u v w t k;
syms N A B phi;
```

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

integral 1

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{1}(x) f{1}(x)] = sectan_int(3, 5, 1, 0);
I{1} = int(formula(f{1}), Hold=true);
I{1}
```

ans =

$$\int \frac{\sin(x)^5}{\cos(x)^8}\,\mathrm{d}x$$

```
% final answer
F{1}
```

ans(x) =

$$\frac{1}{3\cos(x)^3} - \frac{2}{5\cos(x)^5} + \frac{1}{7\cos(x)^7}$$

integral 2

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{2}(x) = cos(2*x)/(sin(x)+cos(x));
I{2} = int(formula(f{2}), Hold=true);
I{2}
```

ans =

$$\int \frac{\cos(2\,x)}{\cos(x)+\sin(x)}\,\mathrm{d}x$$

```
% integral manipulation
sublist = cos(2*x);
subvals = cos(x)^2-sin(x)^2;
fnew{2}(x) = subs(f{2}, sublist, subvals);
fnew{2} = prodfactor(fnew{2});
Inew{2} = intsubs(I{2}, f{2}, fnew{2});
Inew{2}
```

ans =

$$\int (\cos(x)-\sin(x))\mathrm{d}x$$

```
% final answer
F{2}(x) = cos_int(1, 1, 0, Method='one')-sin_int(1, 1, 0, Method='one');
F{2}
```

ans(x) = $\cos(x)+\sin(x)$

integral 3

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{3}(x) f{3}(x)] = quad2rat_int(1, -1, 1, 1, 1, Method='one');
I{3} = int(formula(f{3}), Hold=true);
I{3}
```

ans =

$$\int \frac{x^2+1}{x^4-x^2+1}\,\mathrm{d}x$$

```
% final answer
F{3}
```

ans(x) =

$$\mathrm{atan}\left(\frac{x^2-1}{x}\right)$$

integral 4

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{4}(x) = (x+exp(x))^2;
I{4} = int(formula(f{4}), Hold=true);
I{4}
```

ans =

$$\int (x + e^x)^2 dx$$

```
% integral manipulation
fnew{4} = expand(f{4});
Inew{4} = intsubs(I{4}, f{4}, fnew{4});
Inew{4}
```

ans =

$$\int (e^{2x} + 2\,x\,e^x + x^2) dx$$

```
% final answer
C = sym([1 2 1]);
Cell = cell(3,1);
Cell{1} = sym([0 1 2 0]);
Cell{2} = sym([1 1 1 0]);
Cell{3} = sym([2 1 0 0]);
[n p a b] = components2vector(Cell{:});
F{4}(x) = sum(C.*exp_int(n, p, a, b));
F{4}
```

ans(x) =

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

integral 5

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{5}(x) f{5}(x)] = sincos_int(-3, -1, 1, 0);
I{5} = int(formula(f{5}), Hold=true);
I{5}
```

ans =

$$\int \frac{1}{\cos(x)\,\sin(x)^3} dx$$

```
% final answer
F{5}
```

ans(x) =

$$\log(\tan(x)) - \frac{1}{2\tan(x)^2}$$

integral 6

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{6}(x) = cos(x)/(sin(x)^2-5*sin(x)-6);
I{6} = int(formula(f{6}), Hold=true);
I{6}
```

ans =

$$\int \left(-\frac{\cos(x)}{-\sin(x)^2 + 5\sin(x) + 6}\right) \mathrm{d}x$$

```
% u-substitution
U{6} = sin(x);
Iu{6} = changeIntegrationVariable(I{6}, U{6}, u);
Iu{6}
```

ans =

$$\int \left(-\frac{1}{-u^2 + 5\,u + 6}\right) \mathrm{d}u$$

```
% final answer in terms of u
fu{6}(u) = children(Iu{6}, 1);
Fu{6}(u) = quad1rat_int(-1, 1, -5, -6, 0, 1, u, Method='two');
Fu{6} = combine(Fu{6}, 'log', 'IgnoreAnalyticConstraints', true);
Fu{6} = simplifyFraction(Fu{6});
Fu{6} = split_logs(Fu{6}, 'SplitFactors', false);
Fu{6}
```

ans(u) =

$$\frac{\log\left(\frac{u-6}{u+1}\right)}{7}$$

```
% final answer in terms of x
F{6}(x) = subs(Fu{6}, u, U{6});
F{6}
```

ans(x) =

$$\frac{\log\left(\frac{\sin(x)-6}{\sin(x)+1}\right)}{7}$$

integral 7

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{7}(x) f{7}(x)] = exp_int(0, 1, -1/2, 0);
I{7} = int(formula(f{7}), Hold=true);
I{7}
```

```
ans =
```

$$\int e^{-\frac{x}{2}} \mathrm{d}x$$

```
% final answer
F{7}
```

```
ans(x) =
```

$$-2\,e^{-\frac{x}{2}}$$

integral 8

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{8}(x) = exp(x)*sqrt(exp(x)-1)/(exp(x)+3);
I{8} = int(formula(f{8}), Hold=true);
I{8}
```

```
ans =
```

$$\int \frac{e^x \sqrt{e^x - 1}}{e^x + 3} \mathrm{d}x$$

```
% integral manipulation (part 1)
U{8} = sqrt(exp(x)-1);
Iu{8} = changeIntegrationVariable(I{8}, U{8}, u);
Iu{8}
```

```
ans =
```

$$\int \frac{2\,u^2}{u^2 + 4} \mathrm{d}u$$

```
% integral manipulation (part 2)
sublist = children(Iu{8}, 1);
subvals = partfrac(sublist);
Iu{8} = intsubs(Iu{8}, sublist, subvals);
Iu{8}
```

```
ans =
```

$$\int \left(2 - \frac{8}{u^2 + 4}\right) \mathrm{d}u$$

```
% final answer in terms of u
Cell = cell(2,1);
```

```
Cell{1} = sym([0 1 0 0 0 2]);
Cell{2} = sym([-1 1 0 4 0 -8]);
[n a b c alpha beta] = components2vector(Cell{:});
fu{8}(u) = children(Iu{8}, 1);
Fu{8}(u) = sum(quad1rat_int(n, a, b, c, alpha, beta, u, Method='one'));
Fu{8}
```

ans(u) =

$$2\,u - 4\,\mathrm{atan}\left(\frac{u}{2}\right)$$

```
% final answer in terms of x
F{8}(x) = subs(Fu{8}, u, U{8});
F{8}
```

ans(x) =

$$2\,\sqrt{e^x - 1} - 4\,\mathrm{atan}\left(\frac{\sqrt{e^x - 1}}{2}\right)$$

integral 9

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{9}(x) = 1/(x+sqrt(x));
I{9} = int(formula(f{9}), Hold=true);
I{9}
```

ans =

$$\int \frac{1}{x + \sqrt{x}}\,\mathrm{d}x$$

```
% u-substitution
U{9} = sqrt(x);
Iu{9} = changeIntegrationVariable(I{9}, U{9}, u);
Iu{9}
```

ans =

$$\int \frac{2}{u + 1}\,\mathrm{d}u$$

```
% final answer in terms of u
fu{9}(u) = children(Iu{9}, 1);
Fu{9}(u) = quad1rat_int(-1, 0, 1, 1, 0, 2, u, Method='one');
Fu{9}
```

ans(u) = $2\log(u + 1)$

```
% final answer in terms of x
F{9}(x) = subs(Fu{9}, u, U{9});
F{9}
```

ans(x) = $2\log(\sqrt{x}+1)$

integral 10

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{10}(x) = abs(x-3);
I{10} = int(f{10}, -1, 5, Hold=true);
I{10}
```

ans =

$$\int_{-1}^{5} |x-3|\,\mathrm{d}x$$

```
% final answer
F{10} = release(I{10});
F{10}
```

ans = 10

integral 11

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{11}(x) f{11}(x)] = sincos_int(1, 2019, 1, 0);
I{11} = int(formula(f{11}), Hold=true);
I{11}
```

ans =

$$\int \cos(x)^{2019}\sin(x)\,\mathrm{d}x$$

```
% final answer
F{11}
```

ans(x) =

$$-\frac{\cos(x)^{2020}}{2020}$$

integral 12

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{12}(x) = x*asin(x)/sqrt(1-x^2);
I{12} = int(formula(f{12}), Hold=true);
I{12}
```

ans =

$$\int \frac{x\,\mathrm{asin}(x)}{\sqrt{1-x^2}}\,\mathrm{d}x$$

```
% u-substitution
sublist = [sin(2*u); sqrt(1+cos(2*u))];
subvals = [2*sin(u)*cos(u); sqrt(sym(2))*cos(u)];
U{12} = asin(x);
Iu{12} = changeIntegrationVariable(I{12}, U{12}, u);
Iu{12} = intsubs(Iu{12}, sublist, subvals);
Iu{12}
```

ans =

$$\int u\sin(u)\,\mathrm{d}u$$

```
% final answer in terms of u
fu{12}(u) = children(Iu{12}, 1);
Fu{12}(u) = sinx_int(1, 1, 0, u);
Fu{12}
```

ans(u) = $\sin(u) - u\cos(u)$

```
% final answer in terms of x
F{12}(x) = subs(Fu{12}, u, U{12});
F{12}
```

ans(x) = $x - \mathrm{asin}(x)\,\sqrt{1-x^2}$

integral 13

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{13}(x) = 2*sin(x)/sin(2*x);
I{13} = int(formula(f{13}), Hold=true);
I{13}
```

ans =

$$\int \frac{2\sin(x)}{\sin(2\,x)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{13} = simplify(f{13}, 'IgnoreAnalyticConstraints', true);
Inew{13} = intsubs(I{13}, f{13}, fnew{13});
Inew{13}
```

ans =

$$\int \frac{1}{\cos(x)}\,\mathrm{d}x$$

```
% final answer
F{13}(x) = sec_int(1, 1, 0, Method='two');
F{13}
```

ans(x) =

$$\log\left(\tan(x) + \frac{1}{\cos(x)}\right)$$

integral 14

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{14}(x) f{14}(x)] = cos_int(2, 2, 0, Method='one');
I{14} = int(formula(f{14}), Hold=true);
I{14}
```

ans =

$$\int \cos(2\,x)^2 \mathrm{d}x$$

```
% final answer
F{14}
```

ans(x) =

$$\frac{x}{2} + \frac{\sin(4\,x)}{8}$$

integral 15

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{15}(x) = 1/(x^3+1);
I{15} = int(formula(f{15}), Hold=true);
I{15}
```

ans =

$$\int \frac{1}{x^3 + 1} \mathrm{d}x$$

```
% integral manipulation
fnew{15} = partfrac(f{15});
Inew{15} = intsubs(I{15}, f{15}, fnew{15});
Inew{15}
```

ans =

$$\int \left(\frac{1}{3\,(x+1)} - \frac{\frac{x}{3} - \frac{2}{3}}{x^2 - x + 1}\right) \mathrm{d}x$$

```
% final answer
Cell = cell(2,1);
Cell{1} = sym([-1 0 1 1 0 1/3]);
Cell{2} = sym([-1 1 -1 1 -1/3 2/3]);
[n a b c alpha beta] = components2vector(Cell{:});
F{15}(x) = sum(quad1rat_int(n, a, b, c, alpha, beta, Method='one'));
F{15}
```

ans(x) =

$$\frac{\log(x+1)}{3} - \frac{\log(x^2-x+1)}{6} + \frac{\sqrt{3}\,\operatorname{atan}\left(\frac{\sqrt{3}\,(2\,x-1)}{3}\right)}{3}$$

integral 16

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{16}(x) = x*sin(x)^2;
I{16} = int(formula(f{16}), Hold=true);
I{16}
```

ans =

$$\int x\sin(x)^2\mathrm{d}x$$

```
% integral manipulation
fnew{16} = mapSymType(f{16}, 'sin', @(~) sqrt((1-cos(2*x))/2));
fnew{16} = expand(fnew{16}, 'ArithmeticOnly', true);
Inew{16} = intsubs(I{16}, f{16}, fnew{16});
Inew{16}
```

ans =

$$\int \left(\frac{x}{2} - \frac{x\cos(2\,x)}{2}\right)\mathrm{d}x$$

```
% final answer
F{16}(x) = x^2/4-cosx_int(1, 2, 0)/(2*2);
F{16}
```

ans(x) =

$$\frac{x^2}{4} - \frac{x\sin(2\,x)}{4} - \frac{\cos(2\,x)}{8}$$

integral 17

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{17}(x) = (x+1/x)^2;
I{17} = int(formula(f{17}), Hold=true);
```

```
I{17}
```

ans =

$$\int \left(x+\frac{1}{x}\right)^2 \mathrm{d}x$$

```
% integral manipulation
fnew{17} = expand(f{17});
Inew{17} = intsubs(I{17}, f{17}, fnew{17});
Inew{17}
```

ans =

$$\int \left(\frac{1}{x^2}+x^2+2\right) \mathrm{d}x$$

```
% final answer
F{17}(x) = expand(release(Inew{17}));
F{17}
```

ans(x) =

$$2\,x-\frac{1}{x}+\frac{x^3}{3}$$

integral 18

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{18}(x) f{18}(x)] = quad1rat_int(-1, 1, 4, 29, 0, 3, Method='one');
I{18} = int(formula(f{18}), Hold=true);
I{18}
```

ans =

$$\int \frac{3}{x^2+4\,x+29} \mathrm{d}x$$

```
% final answer
F{18}
```

ans(x) =

$$\frac{3\,\mathrm{atan}\left(\frac{x}{5}+\frac{2}{5}\right)}{5}$$

integral 19

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{19}(x) f{19}(x)] = cot_int(5, 1, 0);
I{19} = int(formula(f{19}), Hold=true);
```

```
I{19}
```

ans =

$$\int \cot(x)^5 \mathrm{d}x$$

```
% final answer
F{19}
```

ans(x) =

$$-\frac{\cot(x)^4}{4} + \frac{\cot(x)^2}{2} + \log(\sin(x))$$

integral 20

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{20}(x) = tan(x)/(x^4-x^2+1);
I{20} = int(f{20}, -1, 1, Hold=true);
I{20}
```

ans =

$$\int_{-1}^{1} \frac{\tan(x)}{x^4 - x^2 + 1} \mathrm{d}x$$

```
% final answer
F{20} = sym(0);
F{20}
```

ans = 0

integral 21

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{21}(x) f{21}(x)] = sincos_int(3, 2, 1, 0);
I{21} = int(formula(f{21}), Hold=true);
I{21}
```

ans =

$$\int \cos(x)^2 \sin(x)^3 \mathrm{d}x$$

```
% final answer
F{21}
```

ans(x) =

$$\frac{\cos(x)^5}{5} - \frac{\cos(x)^3}{3}$$

integral 22

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{22}(x) = 1/(x^2*sqrt(x^2+1));
I{22} = int(formula(f{22}), Hold=true);
I{22}
```

ans =

$$\int \frac{1}{x^2\,\sqrt{x^2+1}}\,\mathrm{d}x$$

```
% integral manipulation
fnew{22}(x) = 1/(x^3*sqrt(1+1/x^2));
Inew{22} = intsubs(I{22}, f{22}, fnew{22});
Inew{22}
```

ans =

$$\int \frac{1}{x^3\,\sqrt{\frac{1}{x^2}+1}}\,\mathrm{d}x$$

```
% u-substitution
U{22} = sqrt(1+1/x^2);
Iu{22} = changeIntegrationVariable(Inew{22}, U{22}, u);
Iu{22}
```

ans =

$$\int (-1)\mathrm{d}u$$

```
% final answer in terms of u
fu{22}(u) = children(Iu{22}, 1);
Fu{22} = int(fu{22});
Fu{22}
```

ans(u) = $-u$

```
% final answer in terms of x
F{22}(x) = subs(Fu{22}, u, U{22});
F{22} = simplify(F{22}, 'IgnoreAnalyticConstraints', true);
F{22}
```

ans(x) =

$$-\frac{\sqrt{x^2+1}}{x}$$

integral 23

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{23}(x) = sin(x)*sec(x)*tan(x);
I{23} = int(formula(f{23}), Hold=true);
I{23}
```

ans =

$$\int \frac{\sin(x)\tan(x)}{\cos(x)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{23}(x) = tan(x)^2;
Inew{23} = intsubs(I{23}, f{23}, fnew{23});
Inew{23}
```

ans =

$$\int \tan(x)^2\mathrm{d}x$$

```
% final answer
F{23}(x) = tan_int(2, 1, 0);
F{23}
```

ans(x) = $\tan(x) - x$

integral 24

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{24}(x) f{24}(x)] = sec_int(3, 1, 0, Method='two');
I{24} = int(formula(f{24}), Hold=true);
I{24}
```

ans =

$$\int \frac{1}{\cos(x)^3}\,\mathrm{d}x$$

```
% final answer
F{24}
```

ans(x) =

$$\frac{\log\left(\tan(x) + \frac{1}{\cos(x)}\right)}{2} + \frac{\sin(x)}{2\cos(x)^2}$$

integral 25

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{25}(x) = 1/(x*sqrt(9*x^2-1));
I{25} = int(formula(f{25}), Hold=true);
I{25}
```

ans =

$$\int \frac{1}{x\,\sqrt{9\,x^2-1}}\,\mathrm{d}x$$

```
% integral manipulation
fnew{25}(x) = 1/(x^2*sqrt(9-1/x^2));
Inew{25} = intsubs(I{25}, f{25}, fnew{25});
Inew{25}
```

ans =

$$\int \frac{1}{x^2\,\sqrt{9-\frac{1}{x^2}}}\,\mathrm{d}x$$

```
% u-substitution
U{25} = 1/x;
Iu{25} = changeIntegrationVariable(Inew{25}, U{25}, u);
Iu{25}
```

ans =

$$\int \left(-\frac{1}{\sqrt{9-u^2}}\right)\mathrm{d}u$$

```
% final answer in terms of u
fu{25}(u) = children(Iu{25}, 1);
Fu{25}(u) = quad1rat_int(-1/2, -1, 0, 9, 0, -1, u, Method='one');
Fu{25}
```

ans(u) =

$$-\mathrm{asin}\left(\frac{u}{3}\right)$$

```
% final answer in terms of x
F{25}(x) = subs(Fu{25}, u, U{25});
F{25}
```

ans(x) =

$$-\mathrm{asin}\left(\frac{1}{3\,x}\right)$$

integral 26

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=5148s

```
% integral definition
f{26}(x) = cos(sqrt(x));
I{26} = int(formula(f{26}), Hold=true);
```

```
I{26}
```

ans =

$$\int \cos(\sqrt{x})\mathrm{d}x$$

```
% u-substitution
U{26} = sqrt(x);
Iu{26} = changeIntegrationVariable(I{26}, U{26}, u);
Iu{26}
```

ans =

$$\int 2\,u\cos(u)\mathrm{d}u$$

```
% final answer in terms of u
fu{26}(u) = children(Iu{26}, 1);
Fu{26}(u) = 2*cosx_int(1, 1, 0, u);
Fu{26}
```

ans(u) = $2\cos(u) + 2\,u\sin(u)$

```
% final answer in terms of x
F{26}(x) = subs(Fu{26}, u, U{26});
F{26}
```

ans(x) = $2\cos(\sqrt{x}) + 2\,\sqrt{x}\,\sin(\sqrt{x})$

integral 27

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
[F{27}(x) f{27}(x)] = csc_int(1, 1, 0, Method='two');
I{27} = int(formula(f{27}), Hold=true);
I{27}
```

ans =

$$\int \frac{1}{\sin(x)}\mathrm{d}x$$

```
% final answer
F{27}
```

ans(x) =

$$-\log\left(\cot(x) + \frac{1}{\sin(x)}\right)$$

integral 28

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
[F{28}(x) f{28}(x)] = quad1rat_int(1/2, 1, 4, 3, 0, 1, Method='two');
I{28} = int(formula(f{28}), Hold=true);
I{28}
```

ans =

$$\int \sqrt{x^2+4\,x+3}\,\mathrm{d}x$$

```
% final answer
F{28} = scale_logs(F{28}, 'Scale', 1/2);
F{28}
```

ans(x) =

$$\frac{(x+2)\,\sqrt{x^2+4\,x+3}}{2}-\frac{\log\left(x+\sqrt{x^2+4\,x+3}+2\right)}{2}$$

integral 29

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
f{29}(x) = exp(2*x)*cos(x);
I{29} = int(formula(f{29}), Hold=true);
I{29}
```

ans =

$$\int \mathrm{e}^{2\,x}\cos(x)\mathrm{d}x$$

```
% final answer
F{29}(x) = release(I{29});
F{29}
```

ans(x) =

$$\frac{\mathrm{e}^{2\,x}\,(2\cos(x)+\sin(x))}{5}$$

integral 30

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
f{30}(x) = (x-3)^9;
I{30} = int(f{30}, 3, 5, Hold=true);
I{30}
```

ans =

$$\int_3^5 (x-3)^9\mathrm{d}x$$

```
% antiderivative
Fanti{30}(x) = (x-3)^10/10;
Fanti{30}
```

ans(x) =

$$\frac{(x-3)^{10}}{10}$$

```
% final answer
F{30} = Fanti{30}(5)-Fanti{30}(3);
F{30}
```

ans =

$$\frac{512}{5}$$

integral 31

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6210s

```
% integral definition
f{31}(x) = 1/sqrt(x-x^(3/2));
I{31} = int(formula(f{31}), Hold=true);
I{31}
```

ans =

$$\int \frac{1}{\sqrt{x - x^{3/2}}}\,\mathrm{d}x$$

```
% integral manipulation
fnew{31}(x) = 1/(sqrt(x)*sqrt(1-sqrt(x)));
Inew{31} = int(formula(fnew{31}), Hold=true);
Inew{31}
```

ans =

$$\int \frac{1}{\sqrt{x}\,\sqrt{1-\sqrt{x}}}\,\mathrm{d}x$$

```
% u-substitution
U{31} = 1-sqrt(x);
Iu{31} = changeIntegrationVariable(Inew{31}, U{31}, u);
Iu{31}
```

ans =

$$\int \left(-\frac{2}{\sqrt{u}}\right)\mathrm{d}u$$

```
% final answer in terms of u
fu{31}(u) = children(Iu{31}, 1);
Fu{31}(u) = release(Iu{31});
Fu{31}
```

ans(u) = $-4\sqrt{u}$

```
% final answer in terms of x
F{31}(x) = subs(Fu{31}, u, U{31});
F{31}
```

ans(x) = $-4\sqrt{1-\sqrt{x}}$

integral 32

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
[F{32}(x) f{32}(x)] = quad1rat_int(-1/2, -1, 1, 0, 0, 1, Method='one');
I{32} = int(formula(f{32}), Hold=true);
I{32}
```

ans =

$$\int \frac{1}{\sqrt{x-x^2}}\,\mathrm{d}x$$

```
% final answer
F{32}
```

ans(x) = $\mathrm{asin}(2\,x-1)$

integral 33

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
f{33}(x) = exp(2*log(x));
I{33} = int(formula(f{33}), Hold=true);
I{33}
```

ans =

$$\int x^2\,\mathrm{d}x$$

```
% final answer
F{33} = release(I{33});
F{33}
```

ans =

$$\frac{x^3}{3}$$

integral 34

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=6595s

```
% integral definition
f{34}(x) = 1/(exp(x)+exp(-x));
I{34} = int(formula(f{34}), Hold=true);
I{34}
```

ans =

$$\int \frac{1}{e^{-x}+e^{x}}\,dx$$

```
% integral manipulation
fnew{34}(x) = rewrite(f{34}, 'cosh');
Inew{34} = intsubs(I{34}, f{34}, fnew{34});
Inew{34}
```

ans =

$$\int \frac{1}{2\cosh(x)}\,dx$$

```
% final answer
F{34}(x) = 1/2*sech_int(1, 1, 0, Method='one');
F{34}
```

ans(x) =

$$\frac{\operatorname{atan}(\sinh(x))}{2}$$

integral 35

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
f{35}(x) = 1/(exp(x)+exp(-x));
I{35} = int(formula(f{35}), Hold=true);
I{35}
```

ans =

$$\int \frac{1}{e^{-x}+e^{x}}\,dx$$

```
% integral manipulation
fnew{35} = rewrite(f{35}, 'cosh');
Inew{35} = intsubs(I{35}, f{35}, fnew{35});
Inew{35}
```

ans =

$$\int \frac{1}{2\cosh(x)}\,dx$$

```
% final answer
F{35}(x) = sech_int(1, 1, 0, Method='one')/2;
```

```
F{35}
```

ans(x) =

$$\frac{\operatorname{atan}(\sinh(x))}{2}$$

integral 36

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
[F{36}(x) f{36}(x)] = logB_int(0, 1, 1, 0, 2);
I{36} = int(formula(f{36}), Hold=true);
I{36}
```

ans =

$$\int \frac{\log(x)}{\log(2)}\,dx$$

```
% integral manipulation
F{36}
```

ans(x) =

$$x\left(\frac{\log(x)}{\log(2)} - \frac{1}{\log(2)}\right)$$

integral 37

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
f{37}(x) = x^3*sin(2*x);
I{37} = int(formula(f{37}), Hold=true);
I{37}
```

ans =

$$\int x^3 \sin(2\,x)\,dx$$

```
% final answer
F{37}(x)  = sinx_int(3, 2, 0)/sym(2)^3;
F{37} = SimplifyFraction(F{37});
F{37}
```

ans(x) =

$$\frac{\cos(2\,x)\,\left(3\,x - 2\,x^3\right)}{4} + \frac{3\sin(2\,x)\,\left(2\,x^2 - 1\right)}{8}$$

integral 38

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
f{38}(x) = x^2*(1+x^3)^(1/3);
I{38} = int(formula(f{38}), Hold=true);
I{38}
```

ans =

$$\int x^2\ (x^3+1)^{1/3}\mathrm{d}x$$

```
% u-substitution
U{38} = 1+x^3;
Iu{38} = changeIntegrationVariable(I{38}, U{38}, u);
Iu{38}
```

ans =

$$\int \frac{u^{1/3}}{3}\mathrm{d}u$$

```
% final answer in terms of u
fu{38}(u) = children(Iu{38}, 1);
Fu{38}(u) = release(Iu{38});
Fu{38}
```

ans(u) =

$$\frac{u^{4/3}}{4}$$

```
% final answer in terms of x
F{38}(x) = subs(Fu{38}, u, U{38});
F{38}
```

ans(x) =

$$\frac{(x^3+1)^{4/3}}{4}$$

integral 39

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
[F{39}(x) f{39}(x)] = quad1rat_int(-2, 1, 0, 4, 0, 1, Method='one');
I{39} = int(formula(f{39}), Hold=true);
I{39}
```

ans =

$$\int \frac{1}{(x^2+4)^2}\mathrm{d}x$$

```
% final answer
```

```
F{39}
```

ans(x) =

$$\frac{\operatorname{atan}\left(\frac{x}{2}\right)}{16}+\frac{x}{8\,\left(x^2+4\right)}$$

integral 40

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
[Fanti{40}(x) f{40}(x)] = quad1rat_int(1/2, 1, 0, -1, 0, 1, Method='two');
I{40} = int(f{40}, 1, 2, Hold=true);
I{40}
```

ans =

$$\int_1^2 \sqrt{x^2-1}\,\mathrm{d}x$$

```
% antiderivative
Fanti{40} = scale_logs(Fanti{40}, 'Scale', 1/2);
Fanti{40}
```

ans(x) =

$$\frac{x\,\sqrt{x^2-1}}{2}-\frac{\log\left(x+\sqrt{x^2-1}\right)}{2}$$

```
% final answer
F{40} = Fanti{40}(2)-Fanti{40}(1);
F{40} = combine(F{40}, 'log', 'IgnoreAnalyticConstraints', true);
F{40} = split_logs(F{40}, 'SplitFactors', false);
F{40}
```

ans =

$$\sqrt{3}-\frac{\log(\sqrt{3}+2)}{2}$$

integral 41

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
[F{41}(x) f{41}(x)] = sinh_int(1, 1, 0, Method='one');
I{41} = int(formula(f{41}), Hold=true);
I{41}
```

ans =

$$\int \sinh(x)\mathrm{d}x$$

```
% final answer
F{41}
```

ans(x) = $\cosh(x)$

integral 42

https://www.youtube.com/watch?v=v2oNWja7M2E

```
% integral definition
[F{42}(x) f{42}(x)] = sinh_int(2, 1, 0, Method='one');
I{42} = int(formula(f{42}), Hold=true);
I{42}
```

ans =

$$\int \sinh(x)^2 \mathrm{d}x$$

```
% final answer
F{42}
```

ans(x) =

$$\frac{\sinh(2\,x)}{4} - \frac{x}{2}$$

integral 43

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
[F{43}(x) f{43}(x)] = sinh_int(3, 1, 0, Method='one');
I{43} = int(formula(f{43}), Hold=true);
I{43}
```

ans =

$$\int \sinh(x)^3 \mathrm{d}x$$

```
% final answer
F{43}
```

ans(x) =

$$\frac{\cosh(x)^3}{3} - \cosh(x)$$

integral 44

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
```

```
[F{44}(x) f{44}(x)] = quad1rat_int(-1/2, 1, 0, 1, 0, 1, Method='two');
I{44} = int(formula(f{44}), Hold=true);
I{44}
```

ans =

$$\int \frac{1}{\sqrt{x^2+1}}\,\mathrm{d}x$$

```
% final answer
F{44} = scale_logs(F{44}, 'Scale', 1/2);
F{44}
```

ans(x) = $\log\left(x+\sqrt{x^2+1}\right)$

integral 45

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=7241s

```
% integral definition
f{45}(x) = log(x+sqrt(x^2+1));
I{45} = int(formula(f{45}), Hold=true);
I{45}
```

ans =

$$\int \log\left(x+\sqrt{x^2+1}\right)\mathrm{d}x$$

```
% integration by parts
dV{45} = sym(1);
Ibp{45} = integrateByParts(I{45}, dV{45});
Ibp{45} = simplifyFraction(Ibp{45});
Ibp{45}
```

ans =

$$x\log\left(x+\sqrt{x^2+1}\right) - \int \frac{x}{\sqrt{x^2+1}}\,\mathrm{d}x$$

```
% final answer
func = @(~) quad1rat_int(-1/2, 1, 0, 1, 1, 0, Method='one');
F{45} = mapSymType(Ibp{45}, 'int', func);
F{45}
```

ans = $x\log\left(x+\sqrt{x^2+1}\right) - \sqrt{x^2+1}$

integral 46

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{46}(x) f{46}(x)] = tanh_int(1, 1, 0);
I{46} = int(formula(f{46}), Hold=true);
```

```
% final answer
F{46}
```

ans(x) = $\log(\cosh(x))$

integral 47

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{47}(x) f{47}(x)] = sech_int(1, 1, 0, Method='one');
I{47} = int(formula(f{47}), Hold=true);
% final answer
F{47}
```

ans(x) = $\operatorname{atan}(\sinh(x))$

integral 48

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{48}(x) f{48}(x)] = atanhx_int(0, 1, 0);
I{48} = int(formula(f{48}), Hold=true);
I{48}
```

ans =

$$\int \operatorname{atanh}(x)\mathrm{d}x$$

```
% final answer
F{48}
```

ans(x) =

$$\frac{\log(1-x^2)}{2} + x\operatorname{atanh}(x)$$

integral 49

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{49}(x) = sqrt(tanh(x));
I{49} = int(formula(f{49}), Hold=true);
I{49}
```

ans =

$$\int \sqrt{\tanh(x)}\,\mathrm{d}x$$

```
% u-substitution (part 1)
```

```
U{49} = formula(f{49});
Iu{49} = changeIntegrationVariable(I{49}, U{49}, u);
Iu{49}
```

ans =

$$\int \left(-\frac{2\,u^2}{u^4-1}\right) \mathrm{d}u$$

```
% u-substitution (part 2)
sublist = children(Iu{49}, 1);
subvals = partfrac(sublist);
Iu{49} = intsubs(Iu{49}, sublist, subvals);
Iu{49}
```

ans =

$$\int \left(\frac{1}{2\,(u+1)} - \frac{1}{2\,(u-1)} - \frac{1}{u^2+1}\right) \mathrm{d}u$$

```
% final answer in terms of u
Cell = cell(3,1);
Cell{1} = sym([-1 0 1 1 0 1/2]);
Cell{2} = sym([-1 0 1 -1 0 -1/2]);
Cell{3} = sym([-1 1 0 1 0 -1]);
[n a b c alpha beta] = components2vector(Cell{:});
fu{49}(u) = children(Iu{49}, 1);
Fu{49}(u) = sum(quad1rat_int(n, a, b, c, alpha, beta, u, Method='one'));
Fu{49}
```

ans(u) =

$$\frac{\log(u+1)}{2} - \frac{\log(u-1)}{2} - \mathrm{atan}(u)$$

```
% final answer in terms of x
F{49}(x) = subs(Fu{49}, u, U{49});
F{49}
```

ans(x) =

$$\frac{\log(\sqrt{\tanh(x)}+1)}{2} - \frac{\log(\sqrt{\tanh(x)}-1)}{2} - \mathrm{atan}(\sqrt{\tanh(x)})$$

integral 50

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{50}(x) = floor(x);
I{50} = int(f{50}, 0, 5, Hold=true);
I{50}
```

ans =

$$\int_0^5 \lfloor x \rfloor \,\mathrm{d}x$$

```
% final answer
F{50} = release(I{50});
F{50}
```

ans = 10

integral 51

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{51}(x) f{51}(x)] = sec_int(6, 1, 0, Method='one');
I{51} = int(formula(f{51}), Hold=true);
I{51}
```

ans =

$$\int \frac{1}{\cos(x)^6}\,\mathrm{d}x$$

```
% final answer
F{51}
```

ans(x) =

$$\frac{\tan(x)^5}{5} + \frac{2\tan(x)^3}{3} + \tan(x)$$

integral 52

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{52}(x) f{52}(x)] = quad1rat_int(-4, 0, 5, -2, 0, 1, Method='one');
I{52} = int(formula(f{52}), Hold=true);
I{52}
```

ans =

$$\int \frac{1}{(5\,x-2)^4}\,\mathrm{d}x$$

```
% final answer
F{52}
```

ans(x) =

$$-\frac{1}{15\,(5\,x-2)^3}$$

integral 53

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{53}(x) f{53}(x)] = quad4log_int(1, 1, 0, 1, Method='one');
I{53} = int(formula(f{53}), Hold=true);
I{53}
```

ans =

$$\int \log(x^2+1)\,\mathrm{d}x$$

```
% final answer
F{53}
```

ans(x) = $2\,\mathrm{atan}(x) - 2\,x + x\log(x^2+1)$

integral 54

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{54}(x) = 1/(x^4+x);
I{54} = int(formula(f{54}), Hold=true);
I{54}
```

ans =

$$\int \frac{1}{x^4+x}\,\mathrm{d}x$$

```
% integral manipulation
fnew{54}(x) = 1/(x^4*(1+x^-3));
Inew{54} = intsubs(I{54}, f{54}, fnew{54});
Inew{54}
```

ans =

$$\int \frac{1}{x^4\left(\frac{1}{x^3}+1\right)}\,\mathrm{d}x$$

```
% u-substitution
U{54} = 1+x^-3;
Iu{54} = changeIntegrationVariable(Inew{54}, U{54}, u);
Iu{54}
```

ans =

$$\int \left(-\frac{1}{3\,u}\right)\mathrm{d}u$$

```
% final answer in terms of u
fu{54}(u) = children(Iu{54}, 1);
```

```
Fu{54} = release(Iu{54});
Fu{54}
```

ans =

$$-\frac{\log(u)}{3}$$

```
% final answer in terms of x
F{54}(x) = subs(Fu{54}, u, U{54});
F{54} = simplify(F{54}, 'IgnoreAnalyticConstraints', true);
F{54}
```

ans(x) =

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

integral 55

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{55}(x) = (1-tan(x))/(1+tan(x));
I{55} = int(formula(f{55}), Hold=true);
I{55}
```

ans =

$$\int \left(-\frac{\tan(x)-1}{\tan(x)+1}\right) \mathrm{d}x$$

```
% integral manipulation
fnew{55} = rewrite(f{55}, 'sincos');
fnew{55} = simplify(fnew{55});
Inew{55} = intsubs(I{55}, f{55}, fnew{55});
Inew{55}
```

ans =

$$\int \frac{\cos(x)-\sin(x)}{\cos(x)+\sin(x)} \mathrm{d}x$$

```
% final answer
F{55}(x) = sincosf_int(1, 0, -1, 1, 1, 1);
F{55}
```

ans(x) = $\log(\cos(x)+\sin(x))$

integral 56

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{56}(x) = x*sec(x)*tan(x);
```

```
I{56} = int(formula(f{56}), Hold=true);
I{56}
```

ans =

$$\int \frac{x\tan(x)}{\cos(x)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{56} = rewrite(f{56}, 'sincos');
Inew{56} = intsubs(I{56}, f{56}, fnew{56});
Inew{56}
```

ans =

$$\int \frac{x\sin(x)}{\cos(x)^2}\,\mathrm{d}x$$

```
% integration by parts
dV{56} = sin(x)/cos(x)^2;
Ibp{56} = integrateByParts(Inew{56}, dV{56});
Ibp{56}
```

ans =

$$\frac{x}{\cos(x)} - \int \frac{1}{\cos(x)}\,\mathrm{d}x$$

```
% final answer
answer = @(~) sec_int(1, 1, 0, Method='two');
F{56}(x) = mapSymType(Ibp{56}, 'int', answer);
F{56}
```

ans(x) =

$$\frac{x}{\cos(x)} - \log\left(\tan(x) + \frac{1}{\cos(x)}\right)$$

integral 57

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{57}(x) f{57}(x)] = asecx_int(0, 1, 0);
I{57} = int(formula(f{57}), Hold=true);
I{57}
```

ans =

$$\int \mathrm{acos}\left(\frac{1}{x}\right)\mathrm{d}x$$

```
% integral manipulation
F{57}
```

ans(x) =

$$x\,\mathrm{acos}\left(\frac{1}{x}\right) - \log\left(x + \sqrt{x^2-1}\right)$$

integral 58

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{58}(x) = (1-cos(x))/(1+cos(x));
I{58} = int(formula(f{58}), Hold=true);
I{58}
```

ans =

$$\int \left(-\frac{\cos(x)-1}{\cos(x)+1}\right) \mathrm{d}x$$

```
% integral manipulation
fnew{58}(x) = csc(x)^2-2*cos(x)/sin(x)^2+cos(x)^2/sin(x)^2;
Inew{58} = intsubs(I{58}, f{58}, fnew{58});
Inew{58}
```

ans =

$$\int \left(\frac{1}{\sin(x)^2} - \frac{2\cos(x)}{\sin(x)^2} + \frac{\cos(x)^2}{\sin(x)^2}\right) \mathrm{d}x$$

```
% final answer
K = sym([1 -2 1]);
Cell = cell(3,1);
Cell{1} = sym([-2 0 1 0]);
Cell{2} = sym([-2 1 1 0]);
Cell{3} = sym([-2 2 1 0]);
[n p a b] = components2vector(Cell{:});
F{58}(x) = sum(K.*sincos_int(n, p, a, b));
F{58}
```

ans(x) =

$$\frac{2}{\sin(x)} - \cos(x)\sin(x) - x - \frac{1}{\tan(x)} - \frac{\cos(x)^3}{\sin(x)}$$

integral 59

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{59}(x) = x^2*sqrt(x+4);
I{59} = int(formula(f{59}), Hold=true);
I{59}
```

ans =

$$\int x^2\,\sqrt{x+4}\,\mathrm{d}x$$

```
% u-substituion
U{59} = sqrt(x+4);
Iu{59} = changeIntegrationVariable(I{59}, U{59}, u);
Iu{59} = expand(Iu{59}, 'ArithmeticOnly', true);
Iu{59}
```

ans =

$$\int (2\,u^6 - 16\,u^4 + 32\,u^2)\mathrm{d}u$$

```
% final answer in terms of u
fu{59}(u) = children(Iu{59}, 1);
Fu{59} = expand(release(Iu{59}));
Fu{59}
```

ans =

$$\frac{2\,u^7}{7} - \frac{16\,u^5}{5} + \frac{32\,u^3}{3}$$

```
% final answer in terms of x
F{59}(x) = subs(Fu{59}, u, U{59});
F{59}
```

ans(x) =

$$\frac{32\,(x+4)^{3/2}}{3} - \frac{16\,(x+4)^{5/2}}{5} + \frac{2\,(x+4)^{7/2}}{7}$$

integral 60

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[Fanti{60}(x) f{60}(x)] = quad1rat_int(1/2, -1, 0, 4, 0, 1, Method='one');
I{60} = int(f{60}, -1, 1, Hold=true);
I{60}
```

ans =

$$\int_{-1}^{1} \sqrt{4-x^2}\,\mathrm{d}x$$

```
% antiderivative
Fanti{60}
```

ans(x) =

$$2\,\mathrm{asin}\left(\frac{x}{2}\right) + \frac{x\,\sqrt{4-x^2}}{2}$$

```
% final answer
```

```
F{60} = Fanti{60}(1)-Fanti{60}(-1);
F{60}
```

ans =

$$\frac{2\pi}{3} + \sqrt{3}$$

integral 61

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{61}(x) f{61}(x)] = quad1rat_int(1/2, 1, 4, 0, 0, 1, Method='two');
I{61} = int(formula(f{61}), Hold=true);
I{61}
```

ans =

$$\int \sqrt{x^2 + 4\,x}\,\mathrm{d}x$$

```
% final answer
F{61} = scale_logs(F{61}, 'Scale', 1/2);
F{61} = SimplifyFraction(F{61});
F{61}
```

ans(x) =

$$\frac{\sqrt{x^2 + 4\,x}\;(x+2)}{2} - 2\log\left(x + \sqrt{x^2 + 4\,x} + 2\right)$$

integral 62

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{62}(x) f{62}(x)] = exp_int(2, 3, 1, 0);
I{62} = int(formula(f{62}), Hold=true);
I{62}
```

ans =

$$\int x^2\,\mathrm{e}^{x^3}\mathrm{d}x$$

```
% final answer
F{62}
```

ans(x) =

$$\frac{\mathrm{e}^{x^3}}{3}$$

integral 63

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
[F{63}(x) f{63}(x)] = exp_int(3, 2, 1, 0);
I{63} = int(formula(f{63}), Hold=true);
I{63}
```

ans =

$$\int x^3\, e^{x^2} dx$$

```
% final answer
F{63} = simplifyFraction(F{63});
F{63}
```

ans(x) =

$$\frac{e^{x^2}\,(x^2-1)}{2}$$

integral 64

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{64}(x) = tan(x)*log(cos(x));
I{64} = int(formula(f{64}), Hold=true);
I{64}
```

ans =

$$\int \log(\cos(x))\,\tan(x) dx$$

```
% u-substitution
U{64} = log(cos(x));
Iu{64} = changeIntegrationVariable(I{64}, U{64}, u);
Iu{64}
```

ans =

$$\int (-u) du$$

```
% final answer in term of u
fu{64}(u) = children(Iu{64}, 1);
Fu{64}(u) = release(Iu{64});
Fu{64}
```

ans(u) =

$$-\frac{u^2}{2}$$

```
% final answer in term of x
F{64}(x) = subs(Fu{64}, u, U{64});
```

```
F{64}
```

ans(x) =

$$-\frac{\log(\cos(x))^2}{2}$$

integral 65

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{65}(x) = 1/(x^3-4*x^2);
I{65} = int(formula(f{65}), Hold=true);
I{65}
```

ans =

$$\int \left(-\frac{1}{4\,x^2 - x^3}\right) \mathrm{d}x$$

```
% integral manipulation
fnew{65} = partfrac(f{65});
Inew{65} = intsubs(I{65}, f{65}, fnew{65});
Inew{65}
```

ans =

$$\int \left(\frac{1}{16\,(x-4)} - \frac{1}{16\,x} - \frac{1}{4\,x^2}\right) \mathrm{d}x$$

```
% final answer
Cell = cell(2,1);
Cell{1} = sym([-1 0 1 -4 0 1/16]);
Cell{2} = sym([-1 0 1 0 0 -1/16]);
Cell{3} = sym([-1 1 0 0 0 -1/4]);
[n a b c alpha beta] = components2vector(Cell{:});
F{65}(x) = sum(quad1rat_int(n, a, b, c, alpha, beta, Method='one'));
F{65}
```

ans(x) =

$$\frac{\log(x-4)}{16} - \frac{\log(x)}{16} + \frac{1}{4\,x}$$

integral 66

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{66}(x) = sin(x)*cos(2*x);
I{66} = int(formula(f{66}), Hold=true);
I{66}
```

ans =

$$\int \cos(2\,x)\,\sin(x)\,\mathrm{d}x$$

```
% integral manipulation
fnew{66} = expand(f{66});
Inew{66} = intsubs(I{66}, f{66}, fnew{66});
Inew{66}
```

ans =

$$\int (2\cos(x)^2\sin(x) - \sin(x))\,\mathrm{d}x$$

```
% final answer
K = sym([2 -1]);
Cell = cell(2,1);
Cell{1} = sym([1 2 1 0]);
Cell{2} = sym([1 0 1 0]);
[n p a b] = components2vector(Cell{:});
F{66}(x) = sum(K.*sincos_int(n, p, a, b));
F{66}
```

ans(x) =

$$\cos(x) - \frac{2\cos(x)^3}{3}$$

integral 67

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=9553s

```
% integral definition
f{67}(x) = 2^log(x);
I{67} = int(formula(f{67}), Hold=true);
I{67}
```

ans =

$$\int 2^{\log(x)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{67}(x) = x^log(sym(2));
Inew{67} = intsubs(I{67}, f{67}, fnew{67});
Inew{67}
```

ans =

$$\int x^{\log(2)}\,\mathrm{d}x$$

```
% final answer
F{67} = release(Inew{67});
F{67}
```

ans =

$$\frac{x^{\log(2)+1}}{\log(2)+1}$$

integral 68

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{68}(x) = sqrt(1+cos(2*x));
I{68} = int(formula(f{68}), Hold=true);
I{68}
```

ans =

$$\int \sqrt{\cos(2\,x)+1}\,\mathrm{d}x$$

```
% integral manipulation
fnew{68}(x) = sqrt(sym(2))*cos(x);
Inew{68} = intsubs(I{68}, f{68}, fnew{68});
Inew{68}
```

ans =

$$\int \sqrt{2}\,\cos(x)\mathrm{d}x$$

```
% final answer
F{68} = release(Inew{68});
F{68}
```

ans = $\sqrt{2}\,\sin(x)$

integral 69

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{69}(x) = 1/(1+tan(x));
I{69} = int(formula(f{69}), Hold=true);
I{69}
```

ans =

$$\int \frac{1}{\tan(x)+1}\mathrm{d}x$$

```
% integral manipulation (part 1)
fnew{69} = 1/2+(cos(x)-sin(x))/(cos(x)+sin(x))/2;
Inew{69} = intsubs(I{69}, f{69}, fnew{69});
Inew{69}
```

ans =

$$\int \left(\frac{\cos(x)-\sin(x)}{2\,(\cos(x)+\sin(x))}+\frac{1}{2}\right)\mathrm{d}x$$

```
% integral manipulation (part 2)
func = @(arg) symfun(children(arg, 1), x);
Inew{69} = children(split_body(Inew{69}));
fnew{69} = cellfun(func, Inew{69}, 'UniformOutput', false);
celldisp(Inew{69})
```

```
ans{1} =
```

$$\int \frac{\cos(x)-\sin(x)}{2\,(\cos(x)+\sin(x))}\,\mathrm{d}x$$

```
ans{2} =
```

$$\int \frac{1}{2}\,\mathrm{d}x$$

```
% u-substitition
func = @(arg, uval) changeIntegrationVariable(arg, uval, u);
U{69} = {cos(x)+sin(x) x};
Iu{69} = cellfun(func, Inew{69}, U{69}, 'UniformOutput', false);
celldisp(Iu{69})
```

```
ans{1} =
```

$$\int \frac{1}{2\,u}\,\mathrm{d}u$$

```
ans{2} =
```

$$\int \frac{1}{2}\,\mathrm{d}u$$

```
% final answer in terms of u
func = @(arg) symfun(children(arg, 1), u);
fu{69} = cellfun(func, Iu{69}, 'UniformOutput', false);
Fu{69} = cellfun(@int, fu{69}, 'UniformOutput', false);
celldisp(Fu{69})
```

```
ans{1} =
```

$$\frac{\log(u)}{2}$$

```
ans{2} =
```

$$\frac{u}{2}$$

```
% final answer in terms of x (cell)
func = @(arg, uval) symfun(subs(arg, u, uval), x);
F{69} = default_struct('cell', 'expr');
F{69}.cell = cellfun(func, Fu{69}, U{69}, 'UniformOutput', false);
celldisp(F{69}.cell)
```

```
ans{1} =
```

$$\frac{\log(\cos(x)+\sin(x))}{2}$$

```
ans{2} =
```

$$\frac{x}{2}$$

```
% final answer in terms of x (expr)
F{69}.expr = sum([F{69}.cell{:}]);
F{69}.expr
```

```
ans(x) =
```

$$\frac{x}{2}+\frac{\log(\cos(x)+\sin(x))}{2}$$

integral 70

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{70}(x) = sqrt(1-log(x)^2)/x;
I{70} = int(f{70}, 1/exp(sym(1)), exp(sym(1)), Hold=true);
I{70}
```

```
ans =
```

$$\int_{e^{-1}}^{e} \frac{\sqrt{1-\log(x)^2}}{x}\,dx$$

```
% u-substitition
assume(0 < u & u < sympi/2);
U{70} = rhs(isolate(log(x) == sin(u), u));
Iu{70} = changeIntegrationVariable(I{70}, U{70}, u);
```

```
Iu{70} = simplify(Iu{70});
Iu{70} = double_integrand(Iu{70});
Iu{70}
```

ans =

$$\int_0^{\frac{\pi}{2}} 2\cos(u)^2 \mathrm{d}u$$

```
% antiderivative
fu{70}(u) = children(Iu{70}, 1);
Fu{70}(u) = 2*cos_int(2, 1, 0, u, Method='one');
Fu{70}
```

ans(u) =

$$u + \frac{\sin(2\,u)}{2}$$

```
% final answer
F{70} = Fu{70}(sympi/2)-Fu{70}(0);
F{70}
```

ans =

$$\frac{\pi}{2}$$

```
clearassum;
```

integral 71

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{71}(x) = 1/(x^(1/3)+1);
I{71} = int(formula(f{71}), Hold=true);
I{71}
```

ans =

$$\int \frac{1}{x^{1/3}+1} \mathrm{d}x$$

```
% u-substitution
U{71} = x^(1/3)+1;
Iu{71} = changeIntegrationVariable(I{71}, U{71}, u);
Iu{71} = expand(Iu{71}, 'ArithmeticOnly', true);
Iu{71}
```

ans =

$$\int \left(3\,u + \frac{3}{u} - 6\right) \mathrm{d}u$$

```
% final answer in terms of u
fu{71}(u) = children(Iu{71}, 1);
```

```
Fu{71} = int(fu{71});
Fu{71}
```

ans(u) =

$$3\log(u) - 6\,u + \frac{3\,u^2}{2}$$

```
% final answer in terms of x
F{71}(x) = subs(Fu{71}, u, U{71});
F{71} = expand(F{71})+9/2;
F{71}
```

ans(x) =

$$3\log(x^{1/3}+1) - 3\,x^{1/3} + \frac{3\,x^{2/3}}{2}$$

integral 72

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{72}(x) f{72}(x)] = quad1rat_int(-1/3, 0, 1, 1, 0, 1, Method='one');
I{72} = int(formula(f{72}), Hold=true);
I{72}
```

ans =

$$\int \frac{1}{(x+1)^{1/3}}\,\mathrm{d}x$$

```
% final answer
F{72}
```

ans(x) =

$$\frac{3\,(x+1)^{2/3}}{2}$$

integral 73

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{73}(x) = (sin(x)+cos(x))^2;
I{73} = int(formula(f{73}), Hold=true);
I{73}
```

ans =

$$\int (\cos(x)+\sin(x))^2\,\mathrm{d}x$$

```
% integral manipulation
fnew{73} = simplify(expand(f{73}));
```

```
Inew{73} = intsubs(I{73}, f{73}, fnew{73});
Inew{73}
```

ans =

$$\int (\sin(2\,x)+1)\mathrm{d}x$$

```
% final answer
Cell = cell(2,1);
Cell{1} = sym([1 2 0]);
Cell{2} = sym([0 2 0]);
[n a b] = components2vector(Cell{:});
F{73}(x) = sum(sin_int(n, a, b, Method='one'));
F{73}
```

ans(x) =

$$x-\frac{\cos(2\,x)}{2}$$

integral 74

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{74}(x) = 2*x*log(1+x);
I{74} = int(formula(f{74}), Hold=true);
I{74}
```

ans =

$$\int 2\,x\log(x+1)\mathrm{d}x$$

```
% integration by parts (part 1)
dV{74} = x;
Ibp{74} = integrateByParts(I{74}, dV{74});
Ibp{74}
```

ans =

$$x^2\log(x+1)-\int \frac{x^2}{x+1}\mathrm{d}x$$

```
% integration by parts (part 2)
sublist = children(findSymType(Ibp{74}, 'int'), 1);
subvals = partfrac(sublist);
Ibp{74} = intsubs(Ibp{74}, sublist, subvals);
Ibp{74}
```

ans =

$$x^2\log(x+1)-\int \left(x+\frac{1}{x+1}-1\right)\mathrm{d}x$$

```
% final answer
F{74}(x) = release(Ibp{74});
```

```
F{74} = collect(F{74}, 'log');
F{74}
```

ans(x) =

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

integral 75

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{75}(x) = 1/(x*(1+sin(log(x))^2));
I{75} = int(formula(f{75}), Hold=true);
I{75}
```

ans =

$$\int \frac{1}{x\,(\sin(\log(x))^2 + 1)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{75}(x) = sec(log(x))^2/(x*(2*tan(log(x))^2+1));
Inew{75} = intsubs(I{75}, f{75}, fnew{75});
Inew{75}
```

ans =

$$\int \frac{1}{x\cos(\log(x))^2\ (2\tan(\log(x))^2 + 1)}\,\mathrm{d}x$$

```
% u-substitution
U{75} = tan(log(x));
Iu{75} = changeIntegrationVariable(I{75}, U{75}, u);
Iu{75} = simplify(Iu{75}, 'IgnoreAnalyticConstraints', true);
Iu{75}
```

ans =

$$\int \frac{1}{2\,u^2 + 1}\,\mathrm{d}u$$

```
% final answer in terms of u
fu{75}(u) = children(Iu{75}, 1);
Fu{75}(u) = quad1rat_int(-1, 2, 0, 1, 0, 1, u, Method='one');
Fu{75} = simplify(Fu{75}, 'IgnoreAnalyticConstraints', true);
Fu{75}
```

ans(u) =

$$\frac{\sqrt{2}\ \mathrm{atan}(\sqrt{2}\ u)}{2}$$

```
% final answer in terms of x
F{75}(x) = subs(Fu{75}, u, U{75});
F{75}
```

ans(x) =

$$\frac{\sqrt{2}\,\mathrm{atan}(\sqrt{2}\,\tan(\log(x)))}{2}$$

integral 76

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{76}(x) = sqrt((1-x)/(1+x));
I{76} = int(formula(f{76}), Hold=true);
I{76}
```

ans =

$$\int \sqrt{-\frac{x-1}{x+1}}\,\mathrm{d}x$$

```
% integral manipulation
fnew{76}(x) = (1-x)/sqrt(1-x^2);
Inew{76} = intsubs(I{76}, f{76}, fnew{76});
Inew{76}
```

ans =

$$\int \left(-\frac{x-1}{\sqrt{1-x^2}}\right)\mathrm{d}x$$

```
% final answer
F{76}(x) = quad1rat_int(-1/2, -1, 0, 1, -1, 1, Method='one');
F{76}
```

ans(x) = $\mathrm{asin}(x) + \sqrt{1-x^2}$

integral 77

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{77}(x) = x^(x/log(x));
I{77} = int(formula(f{77}), Hold=true);
I{77}
```

ans =

$$\int x^{\frac{x}{\log(x)}}\,\mathrm{d}x$$

```
% integral manipulation
fnew{77} = rewrite(f{77}, 'exp');
Inew{77} = intsubs(I{77}, f{77}, fnew{77});
Inew{77}
```

ans =

$$\int e^x dx$$

```
% final answer
F{77} = release(Inew{77});
F{77}
```

ans = e^x

integral 78

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{78}(x) = asin(sqrt(x));
I{78} = int(formula(f{78}), Hold=true);
I{78}
```

ans =

$$\int \mathrm{asin}(\sqrt{x}) dx$$

```
% u-substitution
U{78} = sqrt(x);
Iu{78} = changeIntegrationVariable(I{78}, U{78}, u);
Iu{78}
```

ans =

$$\int 2\, u\, \mathrm{asin}(u) du$$

```
% final answer in terms of u
fu{78}(u) = children(Iu{78}, 1);
Fu{78}(u) = 2*asinx_int(1, 1, 0, u);
Fu{78}
```

ans(u) =

$$u^2\, \mathrm{asin}(u) - \frac{\mathrm{asin}(u)}{2} + \frac{u\, \sqrt{1-u^2}}{2}$$

```
% final answer in terms of x
F{78}(x) = subs(Fu{78}, u, U{78});
F{78}
```

ans(x) =

$$x\, \mathrm{asin}(\sqrt{x}) - \frac{\mathrm{asin}(\sqrt{x})}{2} + \frac{\sqrt{x}\, \sqrt{1-x}}{2}$$

integral 79

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{79}(x) f{79}(x)] = atanx_int(0, 1, 0);
I{79} = int(formula(f{79}), Hold=true);
I{79}
```

ans =

$$\int \mathrm{atan}(x)\mathrm{d}x$$

```
% final answer
F{79}
```

ans(x) =

$$x\,\mathrm{atan}(x) - \frac{\log(x^2+1)}{2}$$

integral 80

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{80}(x) = piecewise(x <= 2, 10, x > 2, 3*x^2-2);
I{80} = int(f{80}, 0, 5, Hold=true);
I{80}
```

ans =

$$\int_0^5 \begin{cases} 10 & \text{if } x \leq 2 \\ 3\,x^2 - 2 & \text{if } 2 < x \end{cases} \mathrm{d}x$$

```
% final answer
F{80} = release(I{80});
F{80}
```

ans = 131

integral 81

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{81}(x) = sin(1/x)/x^3;
I{81} = int(formula(f{81}), Hold=true);
I{81}
```

ans =

$$\int \frac{\sin\left(\frac{1}{x}\right)}{x^3}\mathrm{d}x$$

```
% u-substitution
U{81} = 1/x;
Iu{81} = changeIntegrationVariable(I{81}, U{81}, u);
Iu{81}
```

ans =

$$\int (-u\sin(u))\mathrm{d}u$$

```
% final answer in terms of u
fu{81}(u) = children(Iu{81}, 1);
Fu{81}(u) = -sinx_int(1, 1, 0, u);
Fu{81}
```

ans(u) = $u\cos(u) - \sin(u)$

```
% final answer in terms of x
F{81}(x) = subs(Fu{81}, u, U{81});
F{81}
```

ans(x) =

$$\frac{\cos\left(\frac{1}{x}\right)}{x} - \sin\left(\frac{1}{x}\right)$$

integral 82

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{82}(x) = (x-1)/(x^4-1);
I{82} = int(formula(f{82}), Hold=true);
I{82}
```

ans =

$$\int \frac{x-1}{x^4-1}\mathrm{d}x$$

```
% integral manipulation
fnew{82} = partfrac(f{82});
Inew{82} = intsubs(I{82}, f{82}, fnew{82});
Inew{82}
```

ans =

$$\int \left(\frac{1}{2\ (x+1)} - \frac{\frac{x}{2}-\frac{1}{2}}{x^2+1}\right)\mathrm{d}x$$

```
% final answer
Cell = cell(2,1);
Cell{1} = sym([-1 0 1 1 0 1/2]);
Cell{2} = sym([-1 1 0 1 -1/2 1/2]);
```

```
[n a b c alpha beta] = components2vector(Cell{:});
F{82}(x) = sum(quad1rat_int(n, a, b, c, alpha, beta, Method='one'));
F{82}
```

ans(x) =

$$\frac{\log(x+1)}{2} - \frac{\log(x^2+1)}{4} + \frac{\operatorname{atan}(x)}{2}$$

integral 83

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{83}(x) = sqrt(1+(x-1/(4*x))^2);
I{83} = int(formula(f{83}), Hold=true);
I{83}
```

ans =

$$\int \sqrt{\left(x - \frac{1}{4\,x}\right)^2 + 1}\,\mathrm{d}x$$

```
% integral manipulation
fnew{83}(x) = x+1/(4*x);
Inew{83} = intsubs(I{83}, f{83}, fnew{83});
Inew{83}
```

ans =

$$\int \left(x + \frac{1}{4\,x}\right)\mathrm{d}x$$

```
% final answer
F{83}(x) = release(Inew{83});
F{83}
```

ans(x) =

$$\frac{\log(x)}{4} + \frac{x^2}{2}$$

integral 84

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{84}(x) = exp(tan(x))/(1-sin(x)^2);
I{84} = int(formula(f{84}), Hold=true);
I{84}
```

ans =

$$\int \left(-\frac{\mathrm{e}^{\tan(x)}}{\sin(x)^2 - 1}\right)\mathrm{d}x$$

```
% u-substitution
U{84} = tan(x);
Iu{84} = changeIntegrationVariable(I{84}, U{84}, u);
Iu{84}
```

ans =

$$\int e^u \mathrm{d}u$$

```
% final answer in terms of u
fu{84}(u) = children(Iu{84}, 1);
Fu{84}(u) = release(Iu{84});
Fu{84}
```

ans(u) = e^u

```
% final answer in terms of x
F{84}(x) = subs(Fu{84}, u, U{84});
F{84}
```

ans(x) = $e^{\tan(x)}$

integral 85

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{85}(x) f{85}(x)] = atanx_int(-2, 1, 0);
I{85} = int(formula(f{85}), Hold=true);
I{85}
```

ans =

$$\int \frac{\operatorname{atan}(x)}{x^2} \mathrm{d}x$$

```
% final answer
F{85}
```

ans(x) =

$$\log(x) - \frac{\log(x^2+1)}{2} - \frac{\operatorname{atan}(x)}{x}$$

integral 86

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{86}(x) = atan(x)/(1+x^2);
I{86} = int(formula(f{86}), Hold=true);
I{86}
```

ans =

$$\int \frac{\mathrm{atan}(x)}{x^2+1}\,\mathrm{d}x$$

```
% u-substitution
U{86} = atan(x);
Iu{86} = changeIntegrationVariable(I{86}, U{86}, u);
Iu{86}
```

ans =

$$\int u\,\mathrm{d}u$$

```
% final answer in terms of u
fu{86}(u) = children(Iu{86}, 1);
Fu{86}(u) = release(Iu{86});
Fu{86}
```

ans(u) =

$$\frac{u^2}{2}$$

```
% final answer in terms of x
F{86}(x) = subs(Fu{86}, u, U{86});
F{86}
```

ans(x) =

$$\frac{\mathrm{atan}(x)^2}{2}$$

integral 87

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{87}(x) f{87}(x)] = log_int(0, 2, 1, 0);
I{87} = int(formula(f{87}), Hold=true);
I{87}
```

ans =

$$\int \log(x)^2\,\mathrm{d}x$$

```
% final answer
F{87}
```

ans(x) = $x\,\left(\log(x)^2 - 2\log(x) + 2\right)$

integral 88

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{88}(x) = sqrt(x^2+4)/x^2;
I{88} = int(formula(f{88}), Hold=true);
I{88}
```

ans =

$$\int \frac{\sqrt{x^2+4}}{x^2}\,\mathrm{d}x$$

```
% u-substitution (part 1)
U{88} = rhs(isolate(x == 2*tan(u), u));
Iu{88} = changeIntegrationVariable(I{88}, U{88}, u);
Iu{88} = intsubs(Iu{88}, tan(u)^2+1, sec(u)^2);
Iu{88} = simplify(Iu{88}, 'IgnoreAnalyticConstraints', true);
Iu{88}
```

ans =

$$\int \frac{1}{\cos(u)-\cos(u)^3}\,\mathrm{d}u$$

```
% u-substitution (part 2)
sublist = children(Iu{88}, 1);
subvals = 1/(cos(u)*sin(u)^2);
Iu{88} = intsubs(Iu{88}, sublist, subvals);
Iu{88}
```

ans =

$$\int \frac{1}{\cos(u)\sin(u)^2}\,\mathrm{d}u$$

```
% final answer in terms of u
fu{88}(u) = children(Iu{88}, 1);
Fu{88}(u) = sincos_int(-2, -1, 1, 0, u);
Fu{88}
```

ans(u) =

$$\log\left(\tan(u)+\frac{1}{\cos(u)}\right)-\frac{1}{\sin(u)}$$

```
% final answer in terms of x
F{88}(x) = subs(Fu{88}, u, U{88});
F{88} = Simplify(F{88}, 'IgnoreAnalyticConstraints', true);
F{88} = scale_logs(F{88}, 'Scale', 2);
F{88}
```

ans(x) =

$$\log\left(x+\sqrt{x^2+4}\right)-\frac{\sqrt{x^2+4}}{x}$$

integral 89

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{89}(x) = sqrt(x+4)/x;
I{89} = int(formula(f{89}), Hold=true);
I{89}
```

ans =

$$\int \frac{\sqrt{x+4}}{x}\,\mathrm{d}x$$

```
% u-substitution (part 1)
U{89} = sqrt(x+4);
Iu{89} = changeIntegrationVariable(I{89}, U{89}, u);
Iu{89}
```

ans =

$$\int \frac{2\,u^2}{u^2-4}\,\mathrm{d}u$$

```
% u-substitution (part 2)
sublist = children(Iu{89}, 1);
subvals = partfrac(sublist);
Iu{89} = intsubs(Iu{89}, sublist, subvals);
Iu{89}
```

ans =

$$\int \left(\frac{2}{u-2}-\frac{2}{u+2}+2\right)\mathrm{d}u$$

```
% final answer in terms of u
Cell = cell(3,1);
Cell{1} = sym([-1 0 1 -2 0 2]);
Cell{2} = sym([-1 0 1 2 0 -2]);
Cell{3} = sym([0 0 1 2 0 2]);
[n a b c alpha beta] = components2vector(Cell{:});
fu{89}(u) = children(Iu{89}, 1);
Fu{89}(u) = sum(quad1rat_int(n, a, b, c, alpha, beta, u, Method='one'));
Fu{89} = combine(Fu{89}/2, 'log', 'IgnoreAnalyticConstraints', true);
Fu{89} = 2*Fu{89};
Fu{89}
```

ans(u) =

$$2\,u+2\log\left(\frac{u-2}{u+2}\right)$$

```
% final answer in terms of x
F{89}(x) = subs(Fu{89}, u, U{89});
F{89}
```

ans(x) =

$$2\log\left(\frac{\sqrt{x+4}-2}{\sqrt{x+4}+2}\right)+2\ \sqrt{x+4}$$

integral 90

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{90}(x) = sin(x)^3/(sin(x)^3+cos(x)^3);
I{90} = int(f{90}, 0, sympi/2, Hold=true);
I{90}
```

ans =

$$\int_0^{\frac{\pi}{2}} \frac{\sin(x)^3}{\cos(x)^3+\sin(x)^3}\,\mathrm{d}x$$

```
% u-substitution
U{90} = sympi/2-x;
Iu{90} = changeIntegrationVariable(I{90}, U{90}, u);
Iu{90} = flip_limits(Iu{90});
Iu{90}
```

ans =

$$\int_0^{\frac{\pi}{2}} \frac{\cos(u)^3}{\cos(u)^3+\sin(u)^3}\,\mathrm{d}u$$

```
% modified u-substitution
Iunew{90} = combine((I{90}+Iu{90})/2, 'int');
Iunew{90} = simplify(Iunew{90}, 'IgnoreAnalyticConstraints', true);
Iunew{90}
```

ans =

$$\int_0^{\frac{\pi}{2}} \frac{1}{2}\,\mathrm{d}u$$

```
% antiderivative
funew{90}(u) = children(Iunew{90}, 1);
Funew{90} = int(funew{90});
Funew{90}
```

ans(u) =

$$\frac{u}{2}$$

```
% final answer
F{90} = Funew{90}(sympi/2)-Funew{90}(0);
F{90}
```

ans =

$\frac{\pi}{4}$

integral 91

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{91}(x) = x/(1+x^4);
I{91} = int(formula(f{91}), Hold=true);
I{91}
```

ans =

$$\int \frac{x}{x^4+1}\,\mathrm{d}x$$

```
% u-substitution
U{91} = x^2;
Iu{91} = changeIntegrationVariable(I{91}, U{91}, u);
Iu{91}
```

ans =

$$\int \frac{1}{2\ (u^2+1)}\,\mathrm{d}u$$

```
% final answer in terms of u
fu{91}(u) = children(Iu{91}, 1);
Fu{91}(u) = quad1rat_int(-1, 1, 0, 1, 0, 1/2, u, Method='one');
Fu{91}
```

ans(u) =

$$\frac{\mathrm{atan}(u)}{2}$$

```
% final answer in terms of x
F{91}(x) = subs(Fu{91}, u, U{91});
F{91}
```

ans(x) =

$$\frac{\mathrm{atan}(x^2)}{2}$$

integral 92

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{92}(x) f{92}(x)] = exp_int(0, 1/2, 1, 0);
I{92} = int(formula(f{92}), Hold=true);
I{92}
```

```
ans =
```

$$\int e^{\sqrt{x}}\mathrm{d}x$$

```
% final answer
F{92}
```

ans(x) = $e^{\sqrt{x}}\,(2\,\sqrt{x}-2)$

integral 93

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{93}(x) f{93}(x)] = sin_int(3, 1, 0, Method='one');
I{93} = int(formula(f{93}), Hold=true);
I{93}
```

```
ans =
```

$$\int \sin(x)^3\mathrm{d}x$$

```
% final answer
F{93}
```

```
ans(x) =
```

$$\frac{\cos(x)^3}{3}-\cos(x)$$

integral 94

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{94}(x) = asin(x)/sqrt(1-x^2);
I{94} = int(formula(f{94}), Hold=true);
I{94}
```

```
ans =
```

$$\int \frac{\mathrm{asin}(x)}{\sqrt{1-x^2}}\mathrm{d}x$$

```
% u-substitution
U{94} = asin(x);
Iu{94} = changeIntegrationVariable(I{94}, U{94}, u);
Iu{94}
```

```
ans =
```

$$\int u\mathrm{d}u$$

```
% final answer in terms of u
fu{94}(u) = children(Iu{94}, 1);
Fu{94}(u) = release(Iu{94});
Fu{94}
```

ans(u) =

$$\frac{u^2}{2}$$

```
% final answer in terms of x
F{94}(x) = subs(Fu{94}, u, U{94});
F{94}
```

ans(x) =

$$\frac{\operatorname{asin}(x)^2}{2}$$

integral 95

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{95}(x) = sqrt(1+sin(2*x));
I{95} = int(formula(f{95}), Hold=true);
I{95}
```

ans =

$$\int \sqrt{\sin(2\,x)+1}\,\mathrm{d}x$$

```
% integral manipulation
fnew{95}(x) = sin(x)+cos(x);
Inew{95} = intsubs(I{95}, f{95}, fnew{95});
Inew{95}
```

ans =

$$\int (\cos(x)+\sin(x))\mathrm{d}x$$

```
% final answer
F{95}(x) = release(Inew{95});
F{95}
```

ans(x) = $\sin(x)-\cos(x)$

integral 96

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
[F{96}(x) f{96}(x)] = quad1rat_int(1/4, 0, 1, 0, 0, 1, Method='one');
```

```
I{96} = int(formula(f{96}), Hold=true);
I{96}
```

ans =

$$\int x^{1/4} \mathrm{d}x$$

```
% final answer
F{96}
```

ans(x) =

$$\frac{4\,x^{5/4}}{5}$$

integral 97

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{97}(x) = 1/(1+exp(x));
I{97} = int(formula(f{97}), Hold=true);
I{97}
```

ans =

$$\int \frac{1}{\mathrm{e}^{x}+1} \mathrm{d}x$$

```
% integral manipulation
fnew{97}(x) = exp(-x)/(1+exp(-x));
Inew{97} = intsubs(I{97}, f{97}, fnew{97});
Inew{97}
```

ans =

$$\int \frac{\mathrm{e}^{-x}}{\mathrm{e}^{-x}+1} \mathrm{d}x$$

```
% u-substitution
U{97} = 1+exp(-x);
Iu{97} = changeIntegrationVariable(Inew{97}, U{97}, u);
Iu{97}
```

ans =

$$\int \left(-\frac{1}{u}\right) \mathrm{d}u$$

```
% final answer in terms of u
fu{97}(u) = children(Iu{97}, 1);
Fu{97}(u) = release(Iu{97});
Fu{97}
```

ans(u) = $-\log(u)$

```
% final answer in terms of x
func = @(arg) log(prodfactor(U{97}));
F{97}(x) = subs(Fu{97}, u, U{97});
F{97} = mapSymType(F{97}, 'log', func);
F{97} = split_logs(F{97});
F{97} = Simplify(F{97}, 1, 'IgnoreAnalyticConstraints', true);
F{97}
```

ans(x) = $x - \log(e^x + 1)$

integral 98

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{98}(x) = sqrt(1+exp(x));
I{98} = int(formula(f{98}), Hold=true);
I{98}
```

ans =

$$\int \sqrt{e^x + 1}\,dx$$

```
% u-substitution (part 1)
U{98} = formula(f{98});
Iu{98} = changeIntegrationVariable(I{98}, U{98}, u);
Iu{98}
```

ans =

$$\int \frac{2\,u^2}{u^2 - 1}\,du$$

```
% u-substitution (part 2)
sublist = children(Iu{98}, 1);
subvals = partfrac(sublist);
Iu{98} = intsubs(Iu{98}, sublist, subvals);
Iu{98}
```

ans =

$$\int \left(\frac{1}{u-1} - \frac{1}{u+1} + 2\right) du$$

```
% final answer in terms of u
Cell = cell(3,1);
Cell{1} = sym([-1 0 1 -1 0 1]);
Cell{2} = sym([-1 0 1 1 0 -1]);
Cell{3} = sym([0 0 1 1 0 2]);
[n a b c alpha beta] = components2vector(Cell{:});
fu{98}(u) = children(Iu{98}, 1);
Fu{98}(u) = sum(quad1rat_int(n, a, b, c, alpha, beta, u, Method='one'));
Fu{98} = combine(Fu{98}, 'log', 'IgnoreAnalyticConstraints', true);
Fu{98}
```

ans(u) =

$$2\,u + \log\left(\frac{u-1}{u+1}\right)$$

```
% final answer in terms of x
F{98}(x) = subs(Fu{98}, u, U{98});
F{98}
```

ans(x) =

$$\log\left(\frac{\sqrt{e^x+1}-1}{\sqrt{e^x+1}+1}\right) + 2\,\sqrt{e^x+1}$$

integral 99

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{99}(x) = sqrt(tan(x))/sin(2*x);
I{99} = int(formula(f{99}), Hold=true);
I{99}
```

ans =

$$\int \frac{\sqrt{\tan(x)}}{\sin(2\,x)}\,\mathrm{d}x$$

```
% integral manipulation
fnew{99}(x) = sec(x)^2/(2*sqrt(tan(x)));
Inew{99} = intsubs(I{99}, f{99}, fnew{99});
Inew{99}
```

ans =

$$\int \frac{1}{2\cos(x)^2\,\sqrt{\tan(x)}}\,\mathrm{d}x$$

```
% u-substitution
U{99} = tan(x);
Iu{99} = changeIntegrationVariable(Inew{99}, U{99}, u);
Iu{99}
```

ans =

$$\int \frac{1}{2\,\sqrt{u}}\,\mathrm{d}u$$

```
% final answer in terms of u
fu{99}(u) = children(Iu{99}, 1);
Fu{99}(u) = release(Iu{99});
Fu{99}
```

ans(u) = $\sqrt{u}$

```
% final answer in terms of x
```

```
F{99}(x) = subs(Fu{99}, u, U{99});
F{99}
```

ans(x) = $\sqrt{\tan(x)}$

integral 100

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{100}(x) = 1/(1+sin(x));
I{100} = int(f{100}, 0, sympi/2, Hold=true);
I{100}
```

ans =

$$\int_0^{\frac{\pi}{2}} \frac{1}{\sin(x)+1}\,\mathrm{d}x$$

```
% integral manipulation
fnew{100}(x) = sec(x)^2-sec(x)*tan(x);
Inew{100} = intsubs(I{100}, f{100}, fnew{100});
Inew{100}
```

ans =

$$\int_0^{\frac{\pi}{2}} \left(\frac{1}{\cos(x)^2}-\frac{\tan(x)}{\cos(x)}\right)\mathrm{d}x$$

```
% antiderivative
Fanti{100} = int(fnew{100});
Fanti{100}
```

ans(x) =

$$-\frac{2}{\tan\left(\frac{x}{2}\right)+1}$$

```
% final answer
F{100} = Fanti{100}(sympi/2)-Fanti{100}(0);
F{100}
```

ans = 1

integral 101

https://www.youtube.com/watch?v=dgm4-3-Iv3s&t=12772s

```
% integral definition
f{101}(x) = sin(x)/x+log(x)*cos(x);
I{101} = int(formula(f{101}), Hold=true);
I{101}
```

ans =

$$\int \left(\cos(x)\log(x) + \frac{\sin(x)}{x}\right) \mathrm{d}x$$

```
% final answer
F{101}(x) = sin(x)*log(x);
F{101}
```

ans(x) = $\log(x)\sin(x)$