>

Задание 1

> $Int(z\cdot\ln(z), z) = int(z\cdot\ln(z), z);$
$Int(z^2\cdot\ln(z)^2, z) = int(z^2\cdot\ln(z)^2, z);$
$Int(z^2\cdot\ln(z), z) = int(z^2\cdot\ln(z), z);$
$Int(\ln(z), z) = int(\ln(z), z);$

$$\int z\ln(z)\,dz = \frac{z^2\ln(z)}{2} - \frac{z^2}{4}$$

$$\int z^2\ln(z)^2\,dz = \frac{z^3\ln(z)^2}{3} - \frac{2z^3\ln(z)}{9} + \frac{2z^3}{27}$$

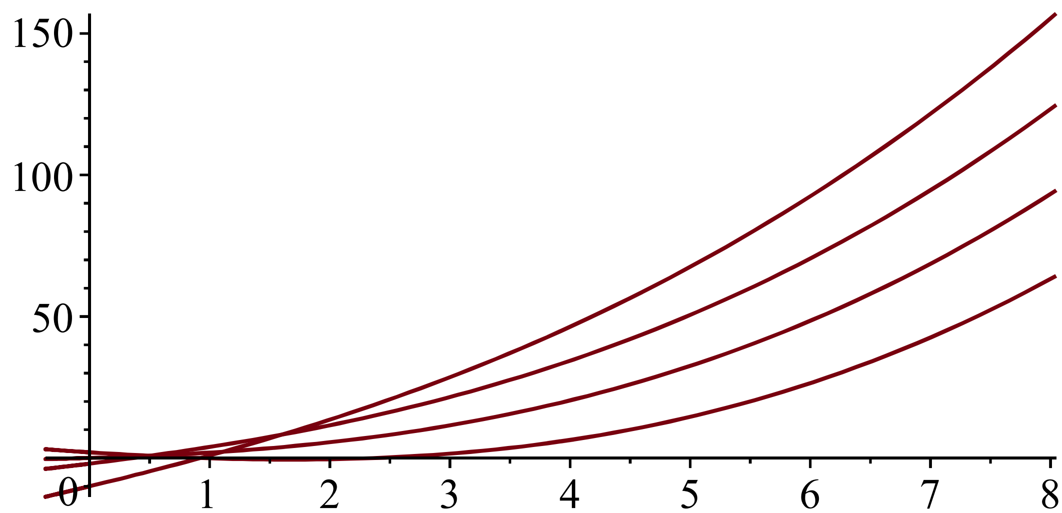
$$\int z^2\ln(z)\,dz = \frac{z^3\ln(z)}{3} - \frac{z^3}{9}$$

$$\int \ln(z)\,dz = z\ln(z) - z \quad \textbf{(1)}$$

> $dsolve(x = y''\cdot\ln(y''));$

$$y(x) = \frac{\left(18\,\mathrm{LambertW}(x)^2 + 15\,\mathrm{LambertW}(x) + 4\right)x^3}{108\,\mathrm{LambertW}(x)^3} + \_C1\,x + \_C2 \quad \textbf{(2)}$$

> $grafic(C1, C2) := plot\left(\left[z\cdot\ln(z), \frac{1}{6}z^3\cdot\ln(z)^2 + \frac{5}{36}z^3\cdot\ln(z) + C1\cdot z\cdot\ln(z) + \frac{1}{27}\cdot z^3 + C2, z = -5..5\right]\right):$
$plots[display](grafic(1, 0), grafic(-3, 2), grafic(5, -2), grafic(10, -10), color = blue);$



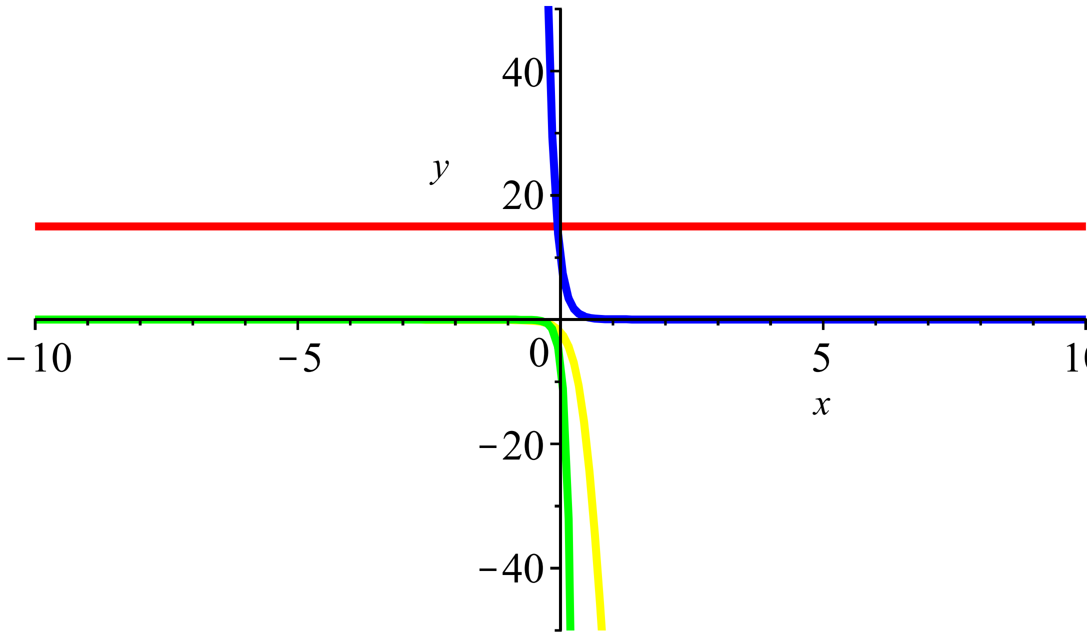
> $Int(\cos(x)^2, x) = int(\cos(x)^2, x);$

$$\int \cos(x)^2\,dx = \frac{\cos(x)\sin(x)}{2} + \frac{x}{2} \quad \textbf{(3)}$$

> $simplify(dsolve(\cos(x)\cdot(y\cdot y'' - y'^2) + \sin(x)\cdot 2\cdot y\cdot y' = 0));$

$$y(x) = \_C2\,e^{\frac{\_C1\,(2x + \sin(2x))}{4}} \quad \textbf{(4)}$$

> $f(C1, C2) := C2\, \mathrm{e}^{\frac{C1\,(2\,x + \sin(2\,x))}{4}}$:
plot([f(0, 15), f(-7, 10), f(5, -2), f(10, -7)], x = -10 .. 10, y = -50 .. 50, color = [red, blue, yellow, green], thickness = 3);



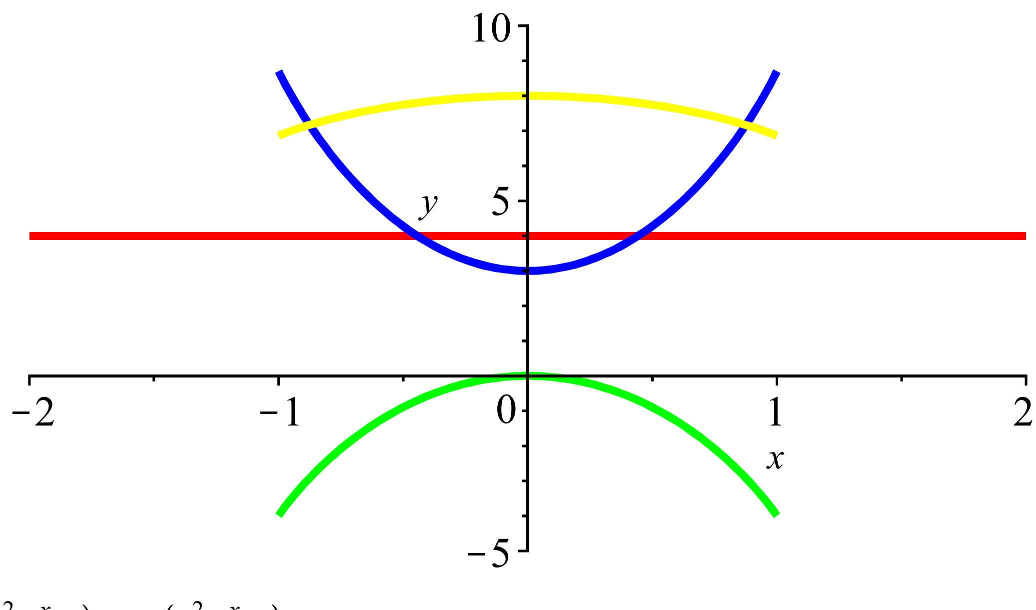
> Int(arcsin(x), x) = int(arcsin(x), x);

$$\int \arcsin(x)\, dx = x \arcsin(x) + \sqrt{-x^2 + 1} \quad \textbf{(5)}$$

> $dsolve\left(y'' \cdot \sqrt{1 - x^2} \cdot \arcsin(x) = y'\right)$;

$$y(x) = \_C1 + \left(x \arcsin(x) + \sqrt{-x^2 + 1}\right) \_C2 \quad \textbf{(6)}$$

> $f(C1, C2) := C1 + \left(x \arcsin(x) + \sqrt{-x^2 + 1}\right) \cdot C2$:
plot([f(4, 0), f(-7, 10), f(10, -2), f(7, -7)], x = -2 .. 2, y = -5 .. 10, color = [red, blue, yellow, green], thickness = 3);



> $Int(x^2 \cdot e^x, x) = int(x^2 \cdot e^x, x)$;

$Int(x^3 \cdot e^x, x) = int(x^3 \cdot e^x, x);$

$$\int x^2 e^x \, dx = \frac{(x^2 \ln(e)^2 - 2\ln(e)\, x + 2)\, e^x}{\ln(e)^3}$$

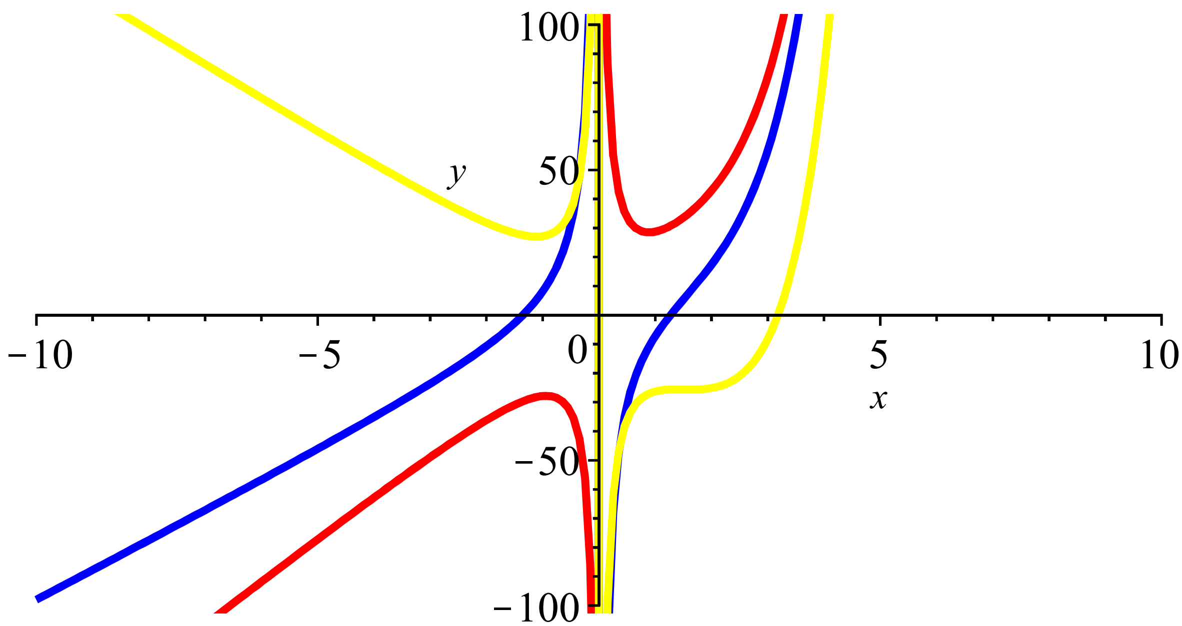
$$\int x^3 e^x \, dx = \frac{(x^3 \ln(e)^3 - 3x^2 \ln(e)^2 + 6\ln(e)\, x - 6)\, e^x}{\ln(e)^4} \quad \textbf{(7)}$$

> $dsolve\left(y'' + \frac{y'}{x} - \frac{y}{x^2} = e^x \cdot (1 + x)\right);$

$$y(x) = \_C1\, x + \frac{\_C2}{x} + \frac{e^x (x^2 - 2x + 2)}{x} \quad \textbf{(8)}$$

> $f(C1, C2) := C1\, x + \frac{C2}{x} + \frac{e^x (x^2 - 2x + 2)}{x}:$

$plot([f(15, 11), f(10, -20), f(-12, -17)], x = -10..10, y = -100..100, color = [red, blue, yellow], thickness = 3);$



Задание 2

> $dsolve\left(y''' \cdot \frac{\cosh(2x)}{\sinh(2x)} = 2\, y''\right);$

$$y(x) = \frac{\_C1 \cosh(2x)}{4} + \_C2\, x + \_C3 \quad \textbf{(9)}$$

Задание 3

> $dsolve(y'' + y = 2 \cdot \cos(3x) - 3 \cdot \sin(3x));$

$$y(x) = \sin(x)\, \_C2 + \cos(x)\, \_C1 + \frac{3\sin(3x)}{8} - \frac{\cos(3x)}{4} \quad \textbf{(10)}$$

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