

Домашнее задание №1

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$$14) \int \operatorname{ctg} x dx = \int \frac{\cos x}{\sin x} dx = \int \frac{\cancel{\cos x}}{\sin x} \cdot \frac{d(\sin x)}{\cancel{\cos x}} = \ln |\sin x| + C;$$

$$15) \int \cos(ax+b) dx = \int \cos(ax+b) \frac{d(ax+b)}{a} = \frac{1}{a} \int \cos(ax+b) \cdot d(ax+b) = \frac{1}{a} \sin(ax+b) + C;$$

$$16) \int \sin \sqrt{x} \cdot \frac{dx}{\sqrt{x}} = \int \sin \sqrt{x} \cdot \frac{\cancel{\sqrt{x}} d(\sqrt{x})}{\cancel{\sqrt{x}}} = 2 \int \sin \sqrt{x} \cdot d(\sqrt{x}) = -2 \cos \sqrt{x} + C;$$

$$17) \int x \cdot 5^{-x^2} dx = \int x \cdot 5^{-x^2} \cdot \frac{d(-x^2)}{-2x} \cdot \frac{1}{-2x} = -\frac{1}{2} \int 5^{-x^2} \cdot d(-x^2) = -\frac{1}{2} \cdot \frac{5^{-x^2}}{\ln 5} + C;$$

$$18) \int \frac{e^{-ax}}{1-e^{-2ax}} dx = \int \frac{e^{-ax}}{1-e^{-2ax}} \cdot \frac{d(e^{-ax})}{-a \cdot e^{-ax}} = -\frac{1}{a} \int \frac{1}{1-e^{-2ax}} d(e^{-ax}) = -\frac{1}{a} \int \frac{1}{1-e^{-2ax}} d(e^{-ax}) = -\frac{1}{a} \arctg(1-e^{-2ax}) + C;$$

$$19) \int \frac{x^2}{\sqrt{x^6+1}} dx = \int \frac{x^2}{\sqrt{x^6+1}} \cdot \frac{d(x^3)}{3x^2} = \frac{1}{3} \int \frac{1}{\sqrt{x^6+1}} d(x^3) = \frac{1}{3} \ln |x^3 + \sqrt{x^6+1}| + C;$$

$$20) \int \frac{x^2-9}{x^2-8} dx = \int \left( \frac{x^2-8}{x^2-8} - \frac{1}{x^2-8} \right) dx = \int 1 \cdot dx - \int \frac{1}{x^2-8} dx = x + \frac{1}{2\sqrt{8}} \ln \left| \frac{x+\sqrt{8}}{x-\sqrt{8}} \right| + C;$$

$$21) \int \frac{dx}{\sqrt{5-3x^2}} = \int \frac{\sqrt{3}}{\sqrt{\frac{5}{3}-x^2}} dx = \frac{1}{\sqrt{3}} \int \frac{1}{\sqrt{\frac{5}{3}-x^2}} dx = \frac{1}{\sqrt{3}} \arcsin \frac{\sqrt{3}x}{\sqrt{5}} + C;$$

$$22) \int \operatorname{tg} x dx = \int \frac{\sin x}{\cos x} dx = \int \frac{\sin x}{\cos x} \cdot \frac{d(\cos x)}{-\sin x} = -\int \frac{1}{\cos x} d(\cos x) = -\ln |\cos x| + C;$$

$$23) \int \frac{x}{4x^2+7} dx = \int \frac{x}{4x^2+7} = \frac{d(4x^2+7)}{8x} = \frac{1}{8} \int \frac{1}{4x^2+7} \cdot d(4x^2+7) = \frac{1}{8} \ln |4x^2+7| + C;$$

$$24) \int \frac{x^2}{3+x^2} dx = \int \frac{3+x^2-3}{3+x^2} dx = \int \left( 1 - \frac{3}{3+x^2} \right) dx = x + C - 3 \int \frac{1}{3+x^2} dx = x - \frac{1}{\sqrt{3}} \arcsin \frac{x}{\sqrt{3}} + C;$$