

### Exercises 1d – integrals by parts and substitution

Find the integral  $\int x^3 e^{x^2} dx$ .  $\left[ \frac{1}{2} (x^2 - 1) e^{x^2} + c. \right]$

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Find the integral  $\int (x^3 - 2x) \sin x^2 dx$ .  $\left[ \frac{1}{2} (\sin x^2 - (x^2 - 2) \cos x^2) + c. \right]$

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Find the integral  $\int \frac{x+1}{x^3} \cos \frac{1}{x} dx$ .  $\left[ -\frac{x+1}{x} \sin \frac{1}{x} - \cos \frac{1}{x} + c \right]$

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Find the integral  $\int \frac{\arcsin x dx}{\sqrt{1-x^2}}$ .  $\left[ \frac{1}{2} \arcsin^2 x + c. \right]$

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Find the integral  $\int \operatorname{arctg} \sqrt{x} dx$ .  $\left[ (x+1) \operatorname{arctg} \sqrt{x} - \sqrt{x} + c. \right]$

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Find the integral  $\int \frac{3-2x}{x^3} e^{2/x} dx$ .  $\left[ \frac{7x-6}{4x} e^{2/x} + c. \right]$

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Find the integral  $\int e^{2 \sin x} \sin 2x dx$ .  $\left[ (\sin x - \frac{1}{2}) e^{2 \sin x} + c. \right]$

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Find the integral  $\int e^{\cos x} \sin 2x dx$ .  $\left[ 2(1 - \cos x) e^{\cos x} + c. \right]$

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Find the integral  $\int (e^{2x} - e^x) \sin(e^x) dx$ .  $\left[ (1 - e^x) \cos(e^x) + \sin(e^x) + c. \right]$

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Find the integral  $\int \frac{\ln x}{x} \operatorname{arctg}(\ln x) dx$ .  $\left[ \frac{1}{2} (\ln^2 x + 1) \operatorname{arctg}(\ln x) - \frac{1}{2} \ln x + c. \right]$

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Find the integral  $\int e^{\sqrt{1-2x}} dx$ .  $\left[ (1 - \sqrt{1-2x}) e^{\sqrt{1-2x}} + c. \right]$

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Find the integral  $\int \sin \sqrt{2x+1} dx$ .  $\left[ \sin \sqrt{2x+1} - \sqrt{2x+1} \cos \sqrt{2x+1} + c. \right]$

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Find the integral  $\int \frac{\ln x dx}{x(\ln x - 2)^2}$ .  $\left[ \ln |\ln x - 2| - \frac{2}{\ln x - 2} + c. \right]$

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Find the integral  $\int \frac{2e^x dx}{e^{2x} - 1}$ .  $\left[ \ln \left| \frac{e^x - 1}{e^x + 1} \right| + c. \right]$

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Find the integral  $\int \frac{e^x dx}{\sqrt{1-2e^x}}$ .  $\left[ -\sqrt{1-2e^x} + c. \right]$

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Find the integral  $\int \frac{dx}{\sqrt{3-2x-x^2}}$ .  $\left[ \arcsin \frac{1}{2}(x+1) + c. \right]$

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Find the integral  $\int \frac{dx}{\sqrt{2-2x+x^2}}$ .  $\left[ \ln(x-1 + \sqrt{2-2x+x^2}) + c. \right]$

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Find the integral  $\int \frac{\sqrt{x}-1}{\sqrt{x+1}} dx$ .  $\left[ (\sqrt{x}-2)^2 + 4 \ln(\sqrt{x}+1) + c. \right]$

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Find the integral  $\int \frac{dx}{\sin 2x}$ .  $\left[ \frac{1}{2} \ln |\operatorname{tg} x| + c. \right]$

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Find the integral  $\int x^2 \ln x^2 dx$ .  $\left[ \frac{2}{3} x^3 \ln |x| - \frac{2}{9} x^3 + c. \right]$

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Find the integral  $\int \frac{dx}{1 - e^x}$ .  $\left[ \ln \left| \frac{e^x}{e^x - 1} \right| + c. \right]$

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Find the integral  $\int \sin 2x \ln(\cos x) dx$ .  $\left[ \left( \frac{1}{2} - \ln(\cos x) \right) \cos^2 x + c. \right]$

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Find the integral  $\int \frac{dx}{e^x + e^{-x}}$ .  $\left[ \operatorname{arctg}(e^x) + c. \right]$

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Find the integral  $\int \frac{dx}{(\sqrt{x} + 1)^2}$ .  $\left[ 2 \ln(\sqrt{x} + 1) + \frac{2}{\sqrt{x} + 1} + c. \right]$

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