
Calculus 1 - Exercises 12

Partial fraction decomposition

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| 1. a) $\int \frac{x+1}{x^2+3x} dx$ | b) $\int \frac{5x-3}{x^2-2x-3} dx$ | c) $\int \frac{2x^3-4x^2-x-3}{x^2-2x-3} dx$ |
| 2. a) $\int \frac{1}{x^3+2x^2} dx$ | b) $\int \frac{x+1}{(x-1)^2(x-3)} dx$ | c) $\int \frac{x+5}{x^2+6x+9} dx$ |
| 3. a) $\int \frac{x+4}{x(x^2+2)} dx$ | b) $\int \frac{x^3}{x^4-16} dx$ | c) $\int \frac{x^5-15x}{x^4-16} dx$ |

Integration by substitution

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| 1. a) $\int x^2 \sin x^3 dx$ | b) $\int \sin^4 x \cos x dx$ | c) $\int \sin x e^{\cos x} dx$ | |
| 2. a) $\int \frac{1}{\sqrt{x}+1} dx$ | b) $\int \frac{9x}{\sqrt{2-3x}+1} dx$ | c) $\int x \sqrt{5x+3} dx$ | |
| 3. a) $\int \frac{e^{2x}}{e^{2x}+1} dx$ | b) $\int \frac{e^{6x}}{e^{2x}+1} dx$ | c) $\int \frac{e^{2x}+5e^x}{e^{2x}+4e^x+3} dx$ | d) $\int \frac{e^x-1}{e^x+1} dx$ |
| 4. * a) $\int \frac{2x}{\sqrt{1-x^4}} dx$ | b) $\int \frac{1}{x \sqrt{x^2-1}} dx$ | c) $\int \sqrt{4-x^2} dx$ | d) $\int \frac{x^2}{\sqrt{9-x^2}} dx$ |

Additional practice exercises

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| 1. a) $\int \frac{1}{x-\sqrt{x}} dx$ | b) $\int \frac{\sqrt{x}}{1+x} dx$ | c)* $\int \frac{1}{x^2} \sqrt[3]{\frac{x+1}{x}} dx$ |
| 2. a) $\int \sin(\sqrt{x}) dx$ | b) $\int e^{\sqrt{x}} dx$ | c) $\int (e^x)^2 \sin(e^x) dx$ |
| 3. a) $\int \frac{e^{2x}}{e^x+1} dx$ | b)* $\int \frac{4}{e^{2x}-4} dx$ | c)** $\int \frac{1}{x^3+1} dx$ |