MATHEMATICS 2
First Practice

Exercise 1: Calculate the following indefinite integrals, by substitution:

$$\int 9\sqrt{3x+2}\,\mathrm{d}x$$

$$\int 12x\sqrt{4x^2-1}\,\mathrm{d}x$$

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

$$\int (2e^x-1/3)^2e^x\,\mathrm{d}x$$

$$\int \frac{5}{x+1}\left(\log(x+1)\right)^{3/2}\mathrm{d}x$$

$$\int_{16}^{25}\frac{e^{\sqrt{x}-4}}{\sqrt{x}}\,\mathrm{d}x$$

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

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

$$\int_1^e\frac{\cos(\log x)}{x}\,\mathrm{d}x$$

$$\int_0^1\frac{x}{3x^2+4}\,\mathrm{d}x$$

$$\int_{\frac{\pi}{6}}^{\frac{\pi}{2}}\frac{\cos x}{\sin x}\,\mathrm{d}x$$

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

$$\int_1^3\frac{1}{\sqrt{x}+x\sqrt{x}}\,\mathrm{d}x$$

Exercise 2: Calculate the following indefinite integrals, by parts:

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

$$\int_0^{\pi} x \, \sin x \, \mathrm{d}x$$

$$\int e^x \, \sin x \, \mathrm{d}x$$

$$\int_1^{e} \log x \, \mathrm{d}x$$

$$\int 4x \log x \, \mathrm{d}x$$

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

$$\int 9x^2 \log x \, \mathrm{d}x$$

Exercise 3: Calculate the following integrals:

$$\int_0^{4} e^{\sqrt{x}} \, \mathrm{d}x$$

$$\int_0^{2\pi} |\sin x| \, \mathrm{d}x$$

$$\int_0^{\pi/3} \frac{\tan x}{1 + \log \cos x} \, \mathrm{d}x$$

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

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

$$\int_0^{2} \frac{x^3}{1 + x^2} \, \mathrm{d}x$$

Exercise 4: Calculate the following integrals by partial fraction:

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

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

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