

MATHEMATICS 2

WORK SHEET 03

Exercise 1. Find the next anti-derivatives:

$$\begin{array}{lll} \textcircled{1} \int x(1-x^2)^3 dx & \textcircled{3} \int \frac{\ln x}{x} dx & \textcircled{5} \int \frac{1}{x \ln x} dx. \\ \textcircled{2} \int x\sqrt{1+4x^2} dx & \textcircled{4} \int xe^{-3x^2+7} dx & \end{array}$$

Exercise 2. Use substitution method to find the next anti-derivatives, then conclude there definite integrals.

$$\begin{array}{l} \textcircled{1} \int \sqrt{\sin x} \cos x dx, \quad \int_{\frac{\pi}{2}}^{\pi} \sqrt{\sin x} \cos x dx. \\ \textcircled{2} \int \frac{x}{x^2+1} dx, \quad \int_0^1 \frac{x}{x^2+1} dx. \end{array}$$

Exercise 3. Find the next integrals using integration by parts.

$$\begin{array}{l} \textcircled{1} \int x \sin x dx. \\ \textcircled{2} \int \ln x dx. \end{array}$$

Exercise 4. Calculate the next integrals.

$$\begin{array}{ll} \textcircled{1} I = \int_{-3}^1 |x+1| dx. & \textcircled{3} K = \int_2^0 \sqrt{|x-1|} dx. \\ \textcircled{2} J = \int_0^3 |x^2-3x+2| dx. & \end{array}$$

Exercise 5. Let f be a real function and $a \in \mathbb{R}$. Prove that

$$\begin{array}{l} \textcircled{1} \text{ If } f \text{ is even, then } \int_{-a}^a f(x) dx = 2 \int_0^a f(x) dx. \\ \textcircled{2} \text{ If } f \text{ is odd, then } \int_{-a}^a f(x) dx = 0. \end{array}$$