

0C2 Exercise Sheet 4

Further integration

1. Use the substitution $x = \sin(u)$ and a trigonometric identity to calculate:

$$\int \sqrt{1-x^2} dx.$$

2. Use the formula for integration by parts ($\int u dv = uv - \int v du$) setting $u = x$ and $dv = e^x dx$ to calculate

$$\int xe^x dx.$$

3. Use the formula for integration by parts with $u = x^2$ and $dv = xe^{x^2} dx$ to calculate

$$\int x^3 e^{x^2} dx.$$

4. Use integration by parts to find the following indefinite integral:

$$\int_1^e x \ln(x) dx$$

5. Find the improper integral

$$\int_1^{\infty} e^{-x} dx$$

6. Find the improper integral

$$\int_{-\infty}^{-1} \frac{1}{x^2} dx.$$