

MA 114 Worksheet #01: Integration by parts

1. Which of the following integrals should be solved using substitution and which should be solved using integration by parts?

(a) $\int x \cos(x^2) dx,$

(c) $\int \frac{\ln(\arctan(x))}{1+x^2} dx,$

(b) $\int e^x \sin(x) dx,$

(d) $\int x e^{x^2} dx$

2. Solve the following integrals using integration by parts:

(a) $\int x^2 \sin(x) dx,$

(f) $\int x^5 \ln(x) dx$

(b) $\int (2x+1)e^x dx,$

(g) $\int e^x \cos x dx$

(c) $\int x \sin(3-x) dx,$

(h) $\int x \ln(1+x) dx$ Hint: Make a substitution first, then try integration by parts.

(d) $\int 2x \arctan(x) dx,$

(e) $\int \ln(x) dx$

3. Let $f(x)$ be a twice differentiable function with $f(1) = 2$, $f(4) = 7$, $f'(1) = 5$ and $f'(4) = 3$. Evaluate $\int_1^4 x f''(x) dx$

4. If $f(0) = g(0) = 0$ and f'' and g'' are continuous, show that

$$\int_0^a f(x)g''(x) dx = f(a)g'(a) - f'(a)g(a) + \int_0^a f''(x)g(x) dx.$$

MA 114 MathExcel-Worksheet # 1: Integration by Parts and Trig Derivatives

1. Evaluate the following integrals.

(a) $\int \frac{1}{9+x^2} dx$

(b) $\int \frac{1}{\sqrt{1-4x^2}} dx$

(c) $\int x\sqrt{2x+1} dx$

2. Evaluate the following integrals by making a substitution and then using integration by parts.

(a) $\int \cos\sqrt{x} dx$

(b) $\int t^3 e^{-t^2} dt$

(c) $\int_0^\pi e^{\cos(t)} \sin(2t) dt$