 Integration by substitution

This resource has been developed to support teachers understand the technique of integration by substitution through worked examples

Indefinite integrals

1. Find given

**Step 1:** Find the derivative using , i.e.

**Step 2:** Rearrange to find and expression for , i.e.

**Step 3:** Use the equations above to substitute into the integrand and integrate

i.e. Let

**Step 4:** Substitute the equation back into the integral

**i.e.**

1. Find given

**Step 1:** Find the derivative using , ie)

**Step 2:** Rearrange to find and expression for , ie)

**Step 3:** Balance the integrand to match the expression in step 2,   
i.e.

**Step 4:** Use the equations above to substitute into the integrand and integrate   
i.e. Let

**Step 5:** Substitute the equation back into the integral

i.e.

Definite integrals

1. Evaluate given

**Step 1:** Find the derivative using , i.e.

**Step 2:** Rearrange to find and expression for , i.e.

**Step 3:** Using the substitution equation, recalculate the integral limits,

i.e. when , and when ,

**Step 4:** Use the equations above and integral limits to substitute into the integrand, integrate and evaluate

i.e. Let