



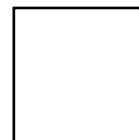
**National Junior College**  
**2016 – 2017 H2 Mathematics**  
**Integration Techniques**

**Equations and Inequalities**

**Assignment**

**Name:** \_\_\_\_\_

**Time**



**Class:** 1ma2\_\_\_\_ / 1IPma21\_\_\_\_ / 1IPma22\_\_\_\_

**Subject Tutor:** \_\_\_\_\_

**Suggested Duration: 55min**

**You are advised to complete this ungraded piece of assignment in one sitting, and to use only MF26. This will allow you to diagnose the weak sub-topic(s) to focus on in your subsequent revision.**

**1** Find (a)  $\int \frac{\ln(1+2x)}{1+2x} dx$ , (b)  $\int \sec^2 x \ln|\cos x| dx$ . [5]

**2** (a) By using the substitution  $x = \frac{1}{u}$ , find  $\int \frac{1}{x\sqrt{x^2-4}} dx$ . [4]

(b) By using the substitution  $x = 5 \cos \theta$ , find  $\int \frac{\sqrt{25-x^2}}{x} dx$ . [6]

**3** (a) Write down the constants  $A$  and  $B$  such that, for all values of  $x$ ,

$$2x+5 = A(x-1) + B.$$

Hence find  $\int \frac{2x+5}{x^2-2x+5} dx$ . [5]

(b) By considering the derivative of  $\tan(x^2)$ , find  $\int x^3 \sec^2(x^2) dx$ . [5]

**4** (i) Show that

$$\frac{d}{dx} \left( \frac{1}{\sqrt{x^2-1}} \right) = -\frac{x}{(x^2-1)^{\frac{3}{2}}}. \quad [1]$$

(ii) By using the substitution  $x = \frac{1}{y}$ , find  $\int \frac{1}{x\sqrt{x^2-1}} dx$ . [3]

(iii) Find  $\int x(x^2-1)^{-\frac{3}{2}} \ln x dx$ . [3]