Name: _____

NATIONAL Applications of Integration (Definite Integrals)

Class: 1ma2_ / 1IPma21_ / 1IPma22_

National Junior College 2016 – 2017 H2 Mathematics

Subject Tutor: _____

Suggested Duration: 40min

You are advised to use only MF26, and complete this assignment in one sitting.

- 1 (i) Sketch the graph of $y = xe^{-2x}$, stating the equations of any asymptotes. [2]
 - (ii) Hence show that

$$\int_1^\infty x \mathrm{e}^{-2x} \,\mathrm{d}x = a + b \mathrm{e}^{-2},$$

where a and b are constants to be determined.

2 Find the exact value of *a* such that

$$\int_{a}^{2\sqrt{3}} \frac{1}{4+x^{2}} dx = \int_{\frac{1}{2}}^{\frac{\sqrt{3}}{2}} \frac{1}{\sqrt{1-x^{2}}} dx.$$
 [4]

3 Use the substitution
$$x = \sec^2 \theta$$
 to find the exact value of $\int_2^4 \frac{1}{x^2 \sqrt{x-1}} dx$. [4]

- 4 (i) Solve $e^x e^{-x} > 0.$ [2]
 - (ii) Use a non-calculator method to find $\int_{-4}^{3} |e^{x} e^{-x}| dx$. Give your answer to 2 decimal places. [3]

Assignment 1

[5]

Time Spent: