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**Mathematics Specialist  
YEAR 12**

**Investigation 3 – Integration**

**Semester 2 2017**

**Take Home Section**

**Time allowed:** One week

**Marks Available:** No marks are allocated toward this section. An in-class validation will be awarded 33 marks.

**Materials required:** Writing implements, correction fluid/tape or eraser, ruler, Scientific or CAS calculator

**Instructions:**

1. Write your answers in the spaces provided in this Question/Answer Booklet.
2. **Show all your working clearly in preparation for the Validation Test**. Your working should be in sufficient detail to allow your answers to be checked readily and for marks to be awarded for reasoning. Incorrect answers given without supporting reasoning cannot be allocated any marks. For any question or part question worth more than two marks, valid working or justification is required to receive full marks. If you repeat an answer to any question, ensure that you cancel the answer you do not wish to have marked.
3. CAS calculators, a Formula Sheet and one unfolded A4 page of notes, back and front, will be permitted to be used during the validation test.
4. Use your CAS calculator **only to aid calculation**.

**Integration by Parts**

The product rule for differentiation of functions and is given by .

By integration with respect to: and by rearranging terms

This is the formula for ***integration by parts.***

**Example 1**

Use integration by parts to determine .

Put and and using

**Example 2**

Use integration by parts to determine

Put and and using

Now put and and again using

)

**(Check the answers on your CAS calculator)**

Use ***integration by parts*** to determine the following integrals:

6. (Use integration by parts twice)

1. (Use integration by parts twice)

1. ( Let )

1. (Note: )

1. (Note:

Use ***integration by parts*** to show that:

1. and hence show that .
2. and hence show that for

**End of Take Home Section of the Investigation**