**Name:**

**Date:**

**Activity 2: Continuation of Equivalence of Expressions**

**Lesson 3**

Part I: Exploring and interpreting the effects of the ENTER button, and the EXPAND and FACTOR commands

I(A) **(with CAS)** Fill in the table below with the calculator screen display as requested:

|  |  |  |  |
| --- | --- | --- | --- |
| Given expression  | Result produced by theENTER button | Result produced byFACTOR | Result produced by EXPAND |
| 1.  |  |  |  |
| 2. |  |  |  |
| 3.  |  |  |  |
| 4.  |  |  |  |

I(B) (with paper and pencil)

1. For given expression 1 (of Part I A): 

* Describe how the structure of each of the 3 forms produced by the calculator compares with that of the given expression.
* Are all three of these forms equivalent to the given expression? Please explain.

2. For given expression 2, , show the algebraic steps you would use to arrive at the form produced by the ENTER button, .

3. Consider the given expression 3, . Show with paper-and-pencil algebra how to obtain the form produced by the FACTOR command, .

4. Consider the given expression 4, . Show with paper-and-pencil algebra how to obtain the form produced by the EXPAND command, .

5. In the table of Part I A above, which expressions are equivalent to each other (state as many as you can)? Please justify your response. Is this equivalence subject to any constraints on admissible values of *x*? Please explain.

## Classroom discussion of Part I A and B

**Part II**: **Showing equivalence of expressions by using various CAS approaches**

Here is a list of four expressions that are equivalent, subject to certain constraints.

Table 1

|  |
| --- |
| Given expression  |
| 1.  |
| 2.  |
| 3.  |
| 4.  |

II(A) Determine the largest common set of admissible values of *x* for this set of expressions. Show and explain how you determined this.

|  |
| --- |
|  |

II(B) Using each of the four methods once and only once, show that all four expressions from Table 1 are equivalent. In Table 2, state what you entered and the CAS results.

Note: you need to be strategic in deciding which expression to use with which command.

(You may use the worksheet provided on the last page for keeping track of your work)



Table 2

|  |  |  |
| --- | --- | --- |
| **CAS method** | **What you enter into the CAS** | **Result displayed by the CAS** |
| Test for equality |  |  |
| FACTOR |  |  |
| EXPAND |  |  |
| ENTER |  |  |

II(C) Using only the results in Table 2, prove the six equivalent statements shown in Table 3.

Note: You need not fill the cells in the order in which they are presented below.

Table 3 (the symbol “≡” denotes equivalence)

|  |  |
| --- | --- |
| **Asserted equivalence** | **Proof of equivalence** |
| Exp1 ≡ Exp2 |  |
| Exp 1 ≡ Exp3 |  |
| Exp1 ≡ Exp4 |  |
| Exp2 ≡ Exp3 |  |
| Exp2 ≡ Exp4 |  |
| Exp3 ≡ Exp4 |  |

**Classroom discussion of Part II A, B, and C**

 **Homework Assignment**

**A.** Prove that the four expressions in Table 4 are equivalent, by means of whatever CAS approach(es) you wish to use. Show your work in Table 5.

**Table 4**

|  |
| --- |
| Given expression  |
| 1.  |
| 2.  |
| 3.  |
| 4.  |

**Table 5**

|  |  |
| --- | --- |
| **What you enter into the CAS** | **Result displayed by the CAS** |
|  |  |
|  |  |
|  |  |
|  |  |

Explain how the results in Table 5 above allow you to conclude that the four expressions are equivalent.

|  |
| --- |
|  |

**B.** Determine the largest common set of admissible values of *x* for this set of expressions. Show how you determined this.

|  |
| --- |
|  |

**C.** Do you find anything surprising about the factored and expanded forms of this given set of expressions? Please explain.

|  |
| --- |
|  |

**Worksheet for Part II (B)**

|  |  |
| --- | --- |
| What you enter into the CAS | Result displayed by the CAS |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |
|  |  |