

## Preparation for CAS Problem Solver: Fraction Machine

### PART A

1. What do you notice about the following pairs of fraction calculations?

$$\frac{3}{5} - \frac{3}{8} \qquad \frac{3}{5} \times \frac{3}{8}$$

$$\frac{4}{7} - \frac{4}{11} \qquad \frac{4}{7} \times \frac{4}{11}$$

$$\frac{3}{4} - \frac{3}{7} \qquad \frac{3}{4} \times \frac{3}{7}$$

$$\frac{5}{8} - \frac{5}{13} \qquad \frac{5}{8} \times \frac{5}{13}$$

$$\frac{6}{5} - \frac{6}{11} \qquad \frac{6}{5} \times \frac{6}{11}$$

2. Find some other pairs of fractions whose difference is equal to their product.

3. Suppose that  $a$  and  $b$  are positive integers. Form a fraction  $\frac{a}{b}$ . Use your CAS calculator to answer the following question: What is the fraction that when subtracted from  $\frac{a}{b}$  or multiplied by  $\frac{a}{b}$  produces the same answer?

4. a) Take a pair of distinct positive integers. Form a fractional number bigger than 1 by dividing the larger by the smaller.

b) Form a new fraction whose numerator is the same as your first fraction and whose denominator is the difference of your two original integers.

c) You now have two fractions. Consider their sum and their product. What do you notice? Can you explain?

d) Use your CAS calculator to generalise your answer to part c).

### PART B: USING DEFINE AND SUBSTITUTION ON TI-89 CAS:

**Example:** The algebraic fraction is defined as  $f_r = \frac{f + \frac{1}{f}}{1 - f^2}$ .

1. Use Define function on your calculator

2. Use the substitution feature on your calculator to find the values of  $f_r$  for the

following pairs of fractions  $f$ :  $\frac{1}{2}, -\frac{1}{2}$ ;  $\frac{1}{4}, -\frac{1}{4}$ ;  $\frac{1}{5}, -\frac{1}{5}$ ;  $\frac{3}{7}, -\frac{3}{7}$ .

3. Look closely at the results. What do you notice? Write down a statement which will summarise what happens.