Bonus Algebra Activities

1. How would you use parentheses to make these equations true?

   $72 \div 2 \times 4 \div 4 + 5 = 1$
   $72 \div 2 \times 4 \div 4 + 5 = 16$
   $72 \div 2 \times 4 \div 4 + 5 = 41$
   $72 \div 2 \times 4 \div 4 + 5 = 10\frac{1}{2}$
   $72 \div 2 \times 4 \div 4 + 5 = 6$

2. What value does the following expression approach as $x \to \infty +$

   $\log_3 (6x - 5) - \log_3 (2x + 1)$

3. If $f(x) = \dfrac{x+1}{x-1}$, evaluate $f\left(\dfrac{f(f(x)) + 1}{f(f(x)) - 1}\right)$

4. Consider the following method for evaluating

$$\sqrt{20 + \sqrt{20 + \sqrt{20 + \sqrt{20 + \cdots}}}}$$

   let $x = \sqrt{20 + \sqrt{20 + \sqrt{20 + \sqrt{20 + \cdots}}}}$

   then $x = \sqrt{20 + x}$

$x^2 = 20 + x$
$x^2 - x - 20 = 0$
$(x - 5)(x + 4) = 0$
$x = 5$ or -4, but $x \neq -4 \therefore x = 5$.

Now you try a similar method for

a) $1 + \dfrac{2}{1 + \dfrac{2}{1 + \dfrac{2}{1 + \dfrac{2}{\circ\circ\circ}}}}$

b) and to evaluate x given:

$$\sqrt{x^{\sqrt{x^{\sqrt{x^{\sqrt{x^{x^{\cdot^{\cdot^{\cdot}}}}}}}}}}} = 2 \text{ and } x > 0$$

ANSWERS: 2.) Expression $\to \log_3 3 = 1$

3.) x

4.) a) 2   b) $x = \sqrt{2}$