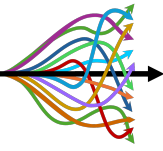# Am I Ready to Contemplate Infinity with Algebra?

These questions are meant to help you gauge your readiness for Non-Euclidean Geometry. Getting the correct answers (which are on the last page) is a good, using a method that works in additional cases is better, but understanding *why* is the gold standard, and one that only you can assess. If you need to use technology to answer these questions, you are probably not a good fit (computers and calculators do not handle infinity well!).

1. Expand the following products:

   (a) $(x^2 + 3x + 2)(2x^3 - 5x + 1)$

   (b) $(x^2 + x + 1)^3$

2. Simplify:
$$\frac{3x^3 + 4x^2 + x + 10}{x + 2}$$

3. Let $f(x) = \sqrt{x + 5}$ and $g(x) = x^2 - 9$.

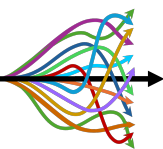   (a) Evaluate $(f \circ g)(x)$ and state the domain.

   (b) Evaluate $(g \circ f)(x)$ and state the domain.

4. Solve for all real values of x:

   (a) $\log(x - 4) = 1 - \log(x - 1)$

   (b) $x = \sqrt{x + 7} + 5$

Answers:

1. (a) $2x^5 + 6x^4 - x^3 - 14x^2 - 7x + 2$ (b) $x^6 + 3x^5 + 6x^4 + 7x^3 + 6x^2 + 3x + 1$

2. $3x^2 - 2x + 5$ for $x \neq -2$

3. (a) $(f \circ g)(x) = \sqrt{x^2 - 4}$, $x \in [-2, 2]$ (b) $(g \circ f)(x) = x - 4$, $x \in \mathbb{R}$

4. (a) $x = -1$ (note: $x \neq 6$)   (b) $x = 9$ (note: $x \neq 2$)