Goal:

- Compute the integer value of a^b for any rational values $a, b \geq 0$

Restrictions:

- Fixed-point infrastructure (integer arithmetic only)
- Execution performance is critical (gas cost per operation)

Solution:

- Rely on the identity $a^b = exp(log(a) \times b)$
- Use the Taylor series for $log(1+x)$ in order to approximate $log(a)$
- Use the Taylor series for $exp(x)$ in order to approximate $exp(log(a) \times b)$

Implementation:

- Every rational value is represented by an integer numerator and an integer denominator
- Every numerator is scaled up by a factor of 2^{125}, in order to achieve maximum precision

Testing Scheme: