• (Book’s Directions)

Steps for Solving an Equation involving Exponential Functions

1. Isolate the exponential function.
2. (a) If convenient, express both sides with a common base and equate the exponents.
   (b) Otherwise, take the natural log of both sides of the equation and use the Power Rule.

• (My Directions)

Steps for Solving an Equation involving Exponential Functions

– Use algebra (including properties of Exponentials/Logs) to get the equation into one of the following forms, and then do the recommended thing.
  (u, v represent any expression with variables. eg. u = x - 1 or v = \( \frac{17x^2 + 1}{5} \))

* \( b^u = b^v \): Then you can equate exponents, and solve \( u = v \)
* \( b^u = some\# \): Take a log of both sides \((\log_b is best)\)
* \( b^u = a^v \): Take a log of both sides (usually we use \( \ln \))

* Hidden Quadratic: \( b^{2u} + a \cdot b^u + c = 0 \): Use a substitution like \( y = b^u \)

• Examples: Solve the following equations:

1. \( 3^{x+1} = 81^x \)
2. \( 5^{3x-1} = \frac{1}{2^x} \)
3. \( 4 \cdot 2^x = 5^{3x-4} \)
4. \( 51 = 7 \cdot e^{x/2} \)
5. \( 25^x + 2 \cdot 5^x = 15 \)
6. \( 3 = \frac{18}{1 - 10^{-3t}} \)
• **Solving Inequalities with Exponents**
  
  – Get 0 on one side of the inequality, call the other side $f(x)$.
  
  – Make a sign chart for $f(x)$
    * You’ll need the Domain of $f(x)$
    * You’ll need the Zeros of $f(x)$
  
  – Pick the appropriate Interval(s) and points(s)

• **Examples**: Solve the following inequalities:

 7. $2^{x^2+x} - 4^3 = 0$

 8. $\frac{e^x}{e^x - 5} \leq 2$

 9. $x^4 2^x < 8x$