

# Curve Fitting an Exponential Function Notes

## Important Information

To write an equation for an exponential function of the form  $y = ab^x$  that passes through two given points you could...

Use the Substitution Method:

- substitute both points into the equation  $y = ab^x$ , solve one of them for  $a$  and substitute what  $a =$  into the other equation.

Use the Equal Values Method:

- substitute both points into the equation  $y = ab^x$ , solve both of the equations for  $a$  and then set the equations equal to each other to solve for  $b$ .

## Equal Values Method

$(2, 2)$  and  $(3, 1)$   
 $2 = ab^2$        $1 = ab^3$   
 $\frac{2}{b^2} = \frac{ab^2}{b^2}$        $\frac{1}{b^3} = \frac{ab^3}{b^3}$   
 $\frac{2}{b^2} = a$        $\frac{1}{b^3} = a$   
 $b^3 \cdot \frac{2}{b^2} = \frac{1}{b^3} \cdot b^3$   
 $\frac{2 \cdot b \cdot \cancel{b} \cdot \cancel{b}}{b \cdot b} = 1$   
 $\frac{2b}{2} = \frac{1}{2}$        $b = \frac{1}{2}$   
 $\frac{1}{(\frac{1}{2})^3} = a$   
 $\frac{1}{\frac{1}{8}} = a$   
 $8 = a$   
 Equation:  $y = 8(\frac{1}{2})^x$

## Substitution Method

$(-1, -2)$  and  $(3, -162)$   
 $-2 = ab^{-1}$        $-162 = ab^3$   
 $-2 = \frac{a}{b}$        $-162 = -2b(b^3)$   
 $b \cdot -2 = \frac{a}{b} \cdot b$        $\frac{-162}{-2} = \frac{-2b^4}{-2}$   
 $-2b = a$        $81 = b^4$   
 $\sqrt[4]{81} = \sqrt[4]{b^4}$   
 $3 = b$   
 $-2(3) = a$   
 $-6 = a$   
 Equation:  $y = -6(3)^x$

Another Example:

Solve whichever way you want.

$(2, 32)$  and  $(3, 128)$