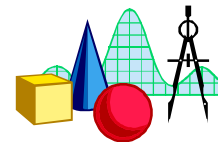




MATH DEPT. TUTORIAL 9



Tutorial 9: Exponential Functions: graphs, solution of equations, inverse.

1. Simplify each of the following expressions.

(a) $5^{2x} 5^{-x+2}$

(b) $3^{-x} 3^{3x}$

(c) $\frac{4^{5x}}{4^{2x}}$

(d) $(4^{6x})^{1/2}$

(e) $(2^{3x})^{-1/3}$

(f) $\frac{(3^{4x})(3^{-2x})}{3^{-3x}}$

2. Solve for x in each of the following

(a) $x^2 2^x - 2^x = 0$

(b) $3^x = 1/27$

(c) $(1/3)^x = 81$

(d) $2^{-x} = 32$

3. Graph each of the following exponential functions.

(a) $y = 3^x$

(b) $y = 3^{-x}$

(c) $y = 3^{x-1}$

(d) $y = -3^{-x}$

(e) $y = 3^x - 1$

(f) $y = 1 - 3^x$

(g) $y = 2 - 3^{-x}$

4. (a) If an account containing \$ 2000 pays interest at 6% per year, compounded annually, find the value of the account after 5 years.
(b) If the same account as in (a) pays interest at the rate of 6% compounded semi-annually, find the value of the account after 5 years.

5. A biologist makes a sample count of bacteria in a culture and finds that the population doubles every 20 minutes. The estimated bacteria count after 2 hours is 3200 .

- (a) What was the initial size of the culture at time $t = 0$?
(b) What is the estimated count after 1 hours ?
(c) What is the count after 3 hours ?
(d) Sketch the graph of the bacterial population function.

6. Does the function $y = 4^x$ have an inverse function ? If so, find the domain and range of the inverse function. Sketch the graph of both $y = 4^x$ and its inverse.