Algebra II | Homework 0110 | Name:
Dr. Paul L. Bailey | Monday, January 10, 2022

We summarize the properties of exponents you need for the first problem. Let a be a positive real number, and let m and n be positive integers.

(1) $a^{m+n} = a^m \cdot a^n$

(2) $a^{mn} = (a^m)^n$

(3) $a^0 = 1$

(4) $a^{-n} = \dfrac{1}{a^n}$

(5) $a^{m/n} = \sqrt[n]{a^m}$

Use these facts to solve the next problem.

Problem 1. Simplify.

(a) $4^{1/2}$

(b) $4^{3/2}$

(c) $27^{4/3}$

(d) $625^{3/4}$

Recall that exponential functions are functions of the form $f(x) = a^x$, where $a > 0$ and $a \neq 1$. Such functions are *injective*, or one-to-one, so if $a^{x_1} = a^{x_2}$, then $x_1 = x_2$. Use this fact to solve the following problems.

Problem 2. Find all real values x which make the equation true.

(a) $3^{x+2} = 3^{2x-1}$

(b) $10^{(3x+4)} = 9$

(c) $16^x = 128$

(d) $9^x - 4 \cdot 3^x - 40 = 20$

(e) $5^{x^2-x+2} = 125$

Problem 3. In each case, $f(x)$ is given and $g(x)$ is its inverse. Use the four step process outlined in class to find $g(x)$.

(a) $f(x) = 3x - 10$

(b) $f(x) = \sqrt{x+3} + 7$

(c) $f(x) = \dfrac{2x+3}{5x+7}$

(d) $f(x) = x^2 - 2x - 15$