

Advanced Algebra Assignment #19

Unit 3 Test Review #2

1) The volume of a particular box can be given by $V(x) = 16x^3$

What type of function is this?

Cubic which IS A Power function

2) the area of a big garden can be given by $A(x) = 3x(x) \quad 3x^2$

What type of function is this?

Quadratic which IS A Power function

3) The total amount of money in an account after x years can be given by $M(x) = 500(1 + \frac{.07}{12})^x$

What type of function is this?

Exponential function
An exponential function has x as the exponent

4) Simplify the following:

a) $(6x^2y^4)(12x^3y^2)$

$$72x^5y^2$$

4a)

$$72x^5y^2$$

b) $4(2x^3)^4$

$$4 \cdot 2^4 x^{12}$$

4b)

$$64x^{12}$$

c) $12x^4y^2 \cdot 3x^3y^{-5}$

$$12 \cdot 3 \cdot 2 \cdot 72x^7y^{-3}$$

4c)

$$\frac{72x^7}{y^3}$$

d) $\frac{18x^2y^4}{32x^6y^{-4}}$

$$\frac{9y^8}{16x^4}$$

4d)

$$\frac{9y^8}{16x^4}$$

5) What is $72^x=419$ written as a logarithm

$$5) \log_{72} 419 = X$$

6) Re-write the equation $\log_2 \frac{1}{32} = x$ as an exponential equation

$$6) 2^x = \frac{1}{32}$$

7) re-write the radical expression $\sqrt[5]{x^7}$ with a rational exponent

$$7) x^{\frac{7}{5}}$$

Solve the following **WITHOUT your calculator**. You want to re-write the exponents as a power raised to a power so you can easily evaluate it.

Problem	Re-write as a power raised to a power	Solution
$8^{\frac{4}{3}}$	$(8^{\frac{1}{3}})^4$	$2^4=16$
$16^{\frac{3}{4}}$	$(16^{\frac{1}{4}})^3 \quad 2^3$	8
$125^{\frac{2}{3}}$	$(125^{\frac{1}{3}})^2 \quad 5^2$	25
$49^{\frac{3}{2}}$	$(49^{\frac{1}{2}})^3$	343
$81^{\frac{3}{4}}$	$(81^{\frac{1}{4}})^3 \quad 3^3$	27
$32^{\frac{2}{5}}$	$(32^{\frac{1}{5}})^2 \quad 2^2$	4
$27^{\frac{2}{3}}$	$(27^{\frac{1}{3}})^2 \quad 3^2$	9

Solve the following exponential equations:

9) $2^{4x} = 16^{3x-2}$

$$2^{4x} = (2^4)^{3x-2}$$

$$4x = 12x - 8$$

$$8 = 8x$$

$$x = 1$$

Final answer for 9

$$x = 1$$

10) $3^{4x} = 81^{5x-2}$

$$3^{4x} = (3^4)^{5x-2}$$

$$4x = 20x - 8$$

$$8 = 16x$$

$$x = \frac{1}{2}$$

Final answer for 10

$$x = \frac{1}{2}$$

11) $3 \ln x = 5$

HINT: $\ln x = \log_e x$

$$e^5 = x^3$$

$$x = 5.29$$

Final answer for 11

$$5.29$$

12) $2 \ln x = 12$

$$\log_e x^2 = 12$$

$$e^{12} = x^2$$

Final answer for 12

$$403$$

13) Find the value of x if $\log_7(x + 5) - \log_7 4 = \log_7 8$

$$\log_7 \frac{x+5}{4} = \log_7 8 \quad \text{so} \quad \frac{x+5}{4} = 8 \quad \boxed{x=27}$$

14) Beth and Jennifer are comparing their savings account. Beth made an initial deposit of \$500 and has a 3% APR that is compounded monthly. Jennifer made an initial deposit of \$450 has an 5% APR compounded quarterly.

a) Write the exponential equations for both of them.

Beth: $y = 500 \left(1 + \frac{.03}{12}\right)^x$

Jennifer: $y = 450 \left(1 + \frac{.05}{4}\right)^x$

They both want to see who will get to \$800 first. Which person will get to \$800 first. Show all your algebraic work and use log as a last step to get full credit.

Beth	Jennifer
$800 = 500 \left(1 + \frac{.03}{12}\right)^x$ $1.6 = \left(1 + \frac{.03}{12}\right)^x$ $\log_8 \left(1 + \frac{.03}{12}\right) 1.6 = x$ 188 months $\boxed{15.6 \text{ years}}$	$800 = 450 \left(1 + \frac{.05}{4}\right)^x$ 1.778 $\log_8 \left(1 + \frac{.05}{4}\right) 1.778 = x$ 46.3 quarters $\boxed{11.575 \text{ years}}$