Practice for Quiz - Exponential Equations and Functions 2.11
Algebra 2./Trig

Name: Answers

For each problem below, SHOW ALL YOUR WORK!

1) Solve for x **algebraically**: $6^{2x+1} = 6^{x-3}$

$2x+1 = x-3$
$-x \quad -x$

$x+1 = -3$
$-1 \quad -1$

$x = -4$

Check: $6^{1(2\cdot -4+1)} \overset{\checkmark}{=} 6^{(-4-3)}$

2) Solve for x **algebraically**:

$5^{x^2+1} = 5^{3x+11}$

$x^2+1 = 3x+11$

$x^2-3x-10=0$

$(x-5)(x+2)=0$

$x=5, \quad x=-2$

Check: $5^{(5^2+1)} = 5^{(3\cdot 5+11)}$ ✓ yes

$5^{((-2)^2+1)} = 5^{(3\cdot -2+11)}$ ✓ yes

3) Solve for x **algebraically**: $4^{x+1} = 8^{x}$

(Change bases so they're the same → rewrite 4 & 8 in terms of 2)

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

$2^{2x+2} = 2^{3x}$

$2x+2 = 3x$
$-2x \quad -2x$

$x=2$

Check: $4^{(2+1)} \overset{\checkmark}{=} 8^2$

4) Solve for x **algebraically**:

$(\frac{1}{9})^{x} = 27^{1-x}$

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

$3^{-2x} = 3^{3-3x}$

$-2x = 3-3x$
$+3x \quad +3x$

$x=3$

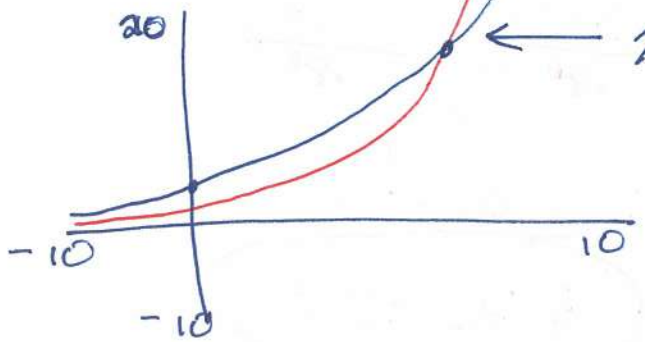
Check: $(\frac{1}{9})^{3} \overset{\checkmark}{=} 27^{1-2}$

5) Solve for x **graphically**, to the nearest thousandth, using your graphing calculator.

$3^{x} = 6^{x-1}$

$y_1 = 3^{x}$

$y_2 = 6^{(x-1)}$



$x = 2.58549625$

$x = 2.585$

6) At the beginning of an experiment, there were two Petri dishes filled with bacteria. Petri dish A's population, y, can be expressed by $y = 100(0.7)^x$ where x is the number of days. Petri dish B's population can be expressed by $y = 20(1.2)^x$. Answer each question below. (Be sure to show all your work, including a sketch of any graphs used).

a) How many bacteria were living in Petri dish A at the beginning of the experiment?
b) Approximately how many days did it take Petri dish B's population to double?
c) After how many days do the two Petri dishes have the same number of bacteria? (Round answer to the nearest tenth of a day.)

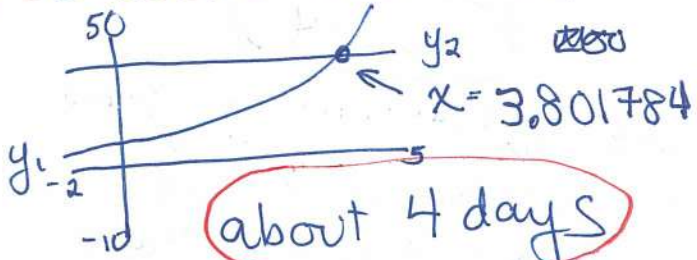
a) 100 (Look at equation to find starting value) $y = 100(.7)^x$

b) B started with 20, so double that is 40.

$40 = 20(1.2)^x$

$y_1 = 20(1.2)^x$

$y_2 = 40$

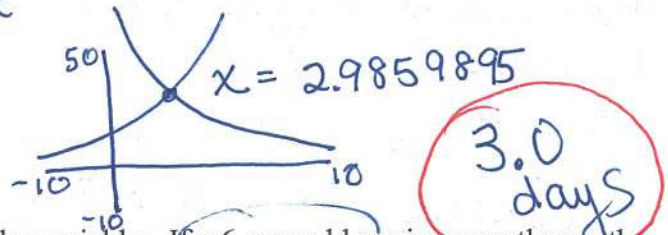


about 4 days

c) $100(.7)^x = 20(1.2)^x$

$y_1 = 100(.7)^x$

$y_2 = 20(1.2)^x$



3.0 days

7) As we know, the value of a new car depreciates rather quickly. If a 6-year old car is currently worth $7,000 with a depreciation rate of 20%, what was the original cost of the car when it was new? (Round to nearest dollar.)

$7000 = P(.80)^x$

$\frac{7000}{.86} = \frac{P(.8)^6}{.86}$

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$26702.88086 = P$

$\$26,703$

To prepare for the quiz, you should also do all the problems on ws: Fun with Exponential Growth and Decay.