Pre-Calculus
Quiz Review: 3.4 – 3.5

Name_____

Date_____Period_____

Solve for x. Approximate your answer to three decimal places.

1.) $-4e^x = -80$

$\dfrac{}{-4} \quad \dfrac{}{-4}$

$e^x = 20$

$\boxed{x = 2.996}$

2.) $\ln x - \ln 3 = 2$

$\ln \dfrac{x}{3} = 2$

$e^2 = \dfrac{x}{3}$

$3e^2 = x$

$\boxed{22.167 = x}$

3.) $\log_6 (x+2) - \log_6 x = 2$

$\log_6 \dfrac{x+2}{x} = 2$

$6^2 = \dfrac{x+2}{x}$

$\boxed{x = \dfrac{2}{35}}$

$36x = x+2$

$35x = 2$

4.) $e^{2x} - 4e^x - 21 = 0$

$(e^x - 7)(e^x + 3) = 0$

$e^x = 7 \qquad e^x = -3$

$\ln 7 = x$

$\boxed{x = 1.946}$

5.) $\log_3 x + \log_3 (x-6) = 3$

$\log_3 x(x-6) = 3$

$\boxed{x = 9}$

$x^2 - 6x - 27 = 0$

$(x-9)(x+3) = 0$

6.) $\log_2 (x+1) - \log_2 (x-4) = 3$

$\log_2 \dfrac{x+1}{x-4} = 3$

$\dfrac{8}{1} = \dfrac{x+1}{x-4}$

$\boxed{x = \dfrac{33}{7}}$

$8x - 32 = x+1$

$7x = 33$

Use the formula to solve question #7.

$$T(t) = T_m + (t_0 - T_m)e^{-kt}$$

T_m = the temperature of the surrounding medium
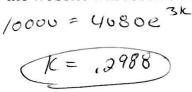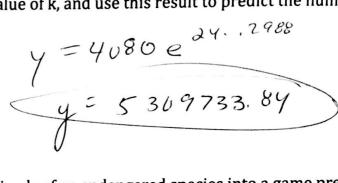
T_0 = initial temperature of the object

7.) A casserole is removed from a 375ºF oven, and it cools to 200ºF after 15 minutes in a 75ºF room. How long (from the time it is taken out of the oven) does it take to cool to 80ºF? Round k to four decimal places and your final answer to the nearest tenth.

$200 = 75 + (375-75)e^{-15k}$

$200 = 75 + 300e^{-15k}$

$\dfrac{125}{300} = \dfrac{300e^{-15k}}{300}$

$\dfrac{5}{12} = e^{-15k}$

$\boxed{k = .0584}$

$80 = 75 + 300e^{-.0584t}$

$5 = 300e^{-.0584t}$

$\boxed{t = 70.1 \text{ min}}$
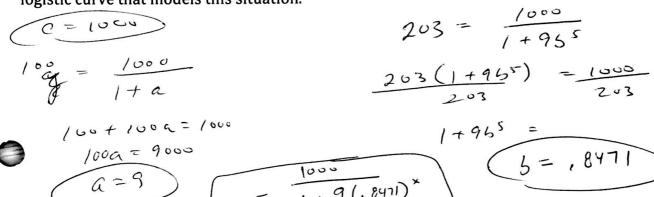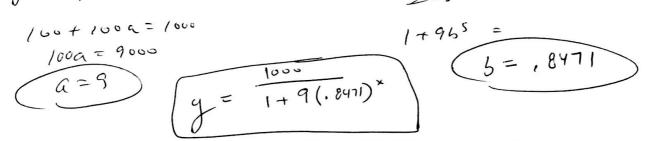
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Solve.

8.) The number y of hits a new search-engine website receives each month can be modeled by $y = 4080e^{kt}$ where t represents the number of months the website has been operating. In the website's third month, there were 10,000 hits. Find the value of k, and use this result to predict the number of hits the website will receive after 24 months.

$10000 = 4080e^{3k}$

$\boxed{k = .2988}$

$y = 4080 e^{24 \cdot .2988}$

$\boxed{y = 5309733.84}$

9.) A conservation organization releases 100 animals of an endangered species into a game preserve. The organization believes that the preserve has a carrying capacity of 1000 animals and that the growth of the curve will follow a logistic model. After 5 months there are 203 animals. Write the equation of the logistic curve that models this situation.

$\boxed{C = 1000}$

$100 = \dfrac{1000}{1+a}$

$100 + 100a = 1000$

$100a = 9000$

$\boxed{a = 9}$

$203 = \dfrac{1000}{1+9b^5}$

$\dfrac{203(1+9b^5)}{203} = \dfrac{1000}{203}$

$1 + 9b^5 =$

$\boxed{b = .8471}$

$\boxed{y = \dfrac{1000}{1+9(.8471)^x}}$

10.) How long will it take an investment of $750 at 6.75% APR compounded quarterly to grow to $1000? Round to the nearest hundredth.

$1000 = 750\left(1 + \dfrac{.0675}{4}\right)^{4t}$

$\dfrac{4}{3} = \left(1 + \dfrac{.0675}{4}\right)^{4t}$

$\boxed{t = 4.3 \text{ years}}$

11.) Jolene invests $2300 and wants to triple her investment in 12 years. What interest rate compounded continuously does she need for this investment? Round to the nearest hundredth.

$A = 6900 = 2300 e^{12r}$

$3 = e^{12r}$

$\dfrac{\ln 3}{12} = r = .0916$

$\boxed{r = 9.16\%}$