Name_____ Date_____ Per._____

UNIT 2b REVIEW

Solve the following equations. Make sure to check for extraneous solutions when appropriate.

(1) $\ln(3x+2) = \ln(5x-8)$

$3x+2 = 5x-8$

$10 = 2x$

$5 = x$

(2) $\log_2(-x+7) = \log_2(x-9)$

$-x+7 = x-9$

$16 = 2x$

$8 = x$

check

$\log_2(-8+7)$

$\log_2(-1)$

← extraneous.

(3) $2^{5x+1} = 16^{x-3}$

$2^{5x+1} = 2^{4(x-3)}$

$5x+1 = 4x-12$

$x = -13$

(4) $\log(3x+1) = 2$

$10^2 = 3x+1$

$100 = 3x+1$

$99 = 3x$

$33 = x$

(5) $6 \cdot \log_3(-x+5) = 18$

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

$3^3 = -x+5$

$27 = -x+5$

$22 = -x$

$x = -22$

(6) $\log_5 2 + \log_5(2x-1) + 4 = 6$

$\log_5 2 + \log_5(2x-1) = 2$

$\log_5 2(2x-1) = 2$

$5^2 = 4x-2$

$25 = 4x-2$

$27 = 4x$

$\frac{27}{4} = x$

(7) $4 \cdot \log_4(5x-9) - 3 = 5$

$4\log_4(5x-9) = 8$

$\log_4(5x-9) = 2$

$4^2 = 5x-9$

$16 = 5x-9$

$5x = 25$

$x = 5$

(8) $\log_3(x-5) - \log_3 4 = 2$

$\log_3\left(\frac{x-5}{4}\right) = 2$

$3^2 = \frac{x-5}{4}$

$9 = \frac{x-5}{4}$

$36 = x-5$

$x = 41$

(9) $4^{x+1} = 53$

$\log_4(53) = x+1$

$\frac{\log(53)}{\log(4)} = x+1$

$x = 1.86$

(10) $3 \cdot 2^{2x-1} = 99$

$2^{2x-1} = 33$

$\log_2(33) = 2x-1$

$\frac{\log 33}{\log 2} = 2x-1$

$x = 3.02$

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UNIT 2b REVIEW

(11) $3^{5x} - 9 = 51$

$3^{5x} = 60$

$\log_3 60 = 5x$

$x = .75$

(12) $3 \cdot e^{3x+2} - 4 = 32$

$3e^{3x+2} = 36$

$e^{3x+2} = 12$

$\log_e(12) = 3x+2$

$x = .16$

Given the graph of $y = \log_2 x$, identify the amount and direction of the translation or the axis the graph is reflected over. Then state the new domain, range and vertical asymptote.

(13) $y = \log_2 x + 3$ Domain: $(0, \infty)$ Range: $(-\infty, \infty)$ V.A.: $x = 0$

(14) $y = \log_2(x+3)$ Domain: $(-3, \infty)$ Range: _____ V.A.: $x = -3$

(15) $y = -\log_2(x)$ Domain: $(0, \infty)$ Range: _____ V.A.: $x = 0$

(16) $y = \log_2 x - 1$ Domain: $(0, \infty)$ Range: _____ V.A.: $x = 0$

(17) $y = \log_2(-x)$ Domain: $(-\infty, 0)$ Range: _____ V.A.: $x = 0$

(18) $y = \log_2(x-5)$ Domain: $(5, \infty)$ Range: _____ V.A.: $x = 5$

(19) You are considering putting money into an account that is being compounded continuously.

(a) How much do you need to invest today, at a rate of 3.9%, to have $5,000 after 8 years?

$5000 = Pe^{.039 \cdot 8}$

$P = 3659.91$

(b) How long will it take to turn $4,000 into $8,000 if the account has a rate of 2.75%

$8000 = 4000e^{.0275t}$

$2 = e^{.0275t}$

$2 = 1.03^t$

$\log_{1.03}(2) = t$

$t = 23.45$

(c) What rate would you need to turn $700 into $1,000 in 10 years?

$1000 = 700e^{r(10)}$

$1.43 = (22026.47)^r$

$r = .036$

3.6%

(20) Once a hurricane reaches land, the wind speed, s (in knots) within the hurricane is related to the time t (in hours) the hurricane remains over land. The equation below can be used to model a hurricanes wind speed. $s = -56.8 \log t + 118$

(a) What would the wind speed be of a hurricane that just hit land 15 minutes ago?

$s = -56.8 \log(1/4) + 118$

$s = 152.20$ knots

(b) How long would a hurricane with a wind speed of 75 knots have been over land?

$75 = -56.8 \log t + 118$

$.76 = \log t$

$10^{.76} = t$

$t = 5.75$