Alb: Test Review

1) $\frac{1}{4} = 8^{8x-2}$

$\frac{1}{2^2} = 2^{3(8x-2)}$

$2^{-2} = 2^{3(8x-2)}$

$-2 = 24x - 6$

$4 = 24x$

$4/24 = x$

$1/6 = x$

(B)

2) $2.43^{x} = 32$

$\log 2.43^{x} = \log 32$

$x \log 2.43 = \log 32$

$\frac{x \log 2.43}{\log 2.43} = \frac{\log 32}{\log 2.43}$

$x \approx 3.9$ (B)

3) $e^{-.07t} = 8$

$\ln e^{-.07t} = \ln 8$

$-.07t = \ln 8$

$t = \frac{\ln 8}{-.07}$

$t \approx -29.71$ (C)

4) $\log_5 (3x+9) = 2$

$5^2 = 3x + 9$

$25 = 3x + 9$

$16 = 3x$

$16/3 = x$ (B)

5) $\frac{30000}{1000} = \frac{1000\,2^t}{1000}$

$30 = 2^t$

$\log 30 = \log 2^t$

$\log 30 = t \log 2$

$\frac{\log 30}{\log 2} = t$

$4.91 \approx t$ (D)

6) $B = 100e^{kt}$

$\frac{3294}{100} = \frac{100e^{k(6)}}{100}$

$32.94 = e^{k(6)}$

$\ln 32.94 = 6k$

$\frac{\ln 32.94}{6} = \frac{6k}{6}$

$.582 \approx k$ (C)

7) $R = \log_{10} I$

$R = \log_{10}(85{,}000{,}000)$

$R = 7.9294$ (A)

Short Answer:

1) $\log_9 27 = 3/2$

$9^{3/2} = 27$

2) $\log_2 16 = x$

$2^x = 16$

$2^x = 2^4$

$x = 4$

3) $\log_7 \frac{1}{49} = x$

$7^x = \frac{1}{7^2}$

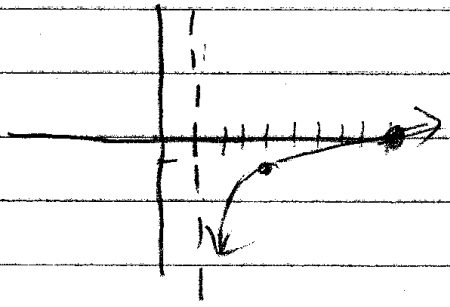
$7^x = 7^{-2}$

$x = -2$

4) $y = \log_2(x-1) - 3$

graph on calc

$y = \log(x-1)/\log 2 - 3$



D: $(1, \infty)$

R: $\mathbb{R}$

x int $(9, 0)$

Zero @ $x = 9$

Asy: $x = 1$

right 1, down 3

Rate of Change

A(2, -3) B(3, -2) and

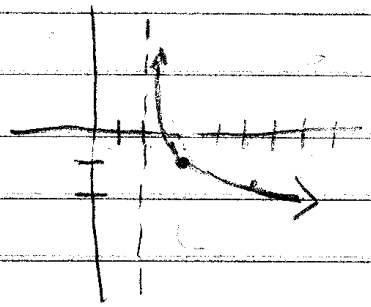
$m = \frac{-2-(-3)}{3-2} = \frac{1}{1} = 1$

C(7, -.415) D(8, -.1976)

$m = \frac{-.1976-(-.415)}{8-7} = .2175$

Greater between A and B

5) $y = -\ln(x-2) - 1$



D: $(2, \infty)$
R: $\mathbb{R}$
Int: (2.4, 0) (Find The zero)
zero @ $x = 2.4$
Asym: $x = 2$
reflects across x axis,
right 2, down 1

6) $\frac{1}{2}\log_5 16 - 3\log_5 x + 4\log_5 y$

$\log_5 16^{1/2} - \log_5 x^3 + \log_5 y^4$

$\log_5 4 - \log_5 x^3 + \log_5 y^4$

$\log_5 \frac{4}{x^3} + \log_5 y^4$

$\log_5 \frac{4y^4}{x^3}$

7) $\ln \frac{2x}{y^4} =$

$\ln 2x - \ln y^4$

$\ln 2 + \ln x + 4 \ln y$

8) $\frac{\log 7}{\log 4} \approx 1.4$

9) $\frac{\log 5}{\log 3} = 1.46$

10) $\frac{\log 782}{\log 12} = 2.681$

11) The x + y coordinates are reversed because they are inverses.

12) $2^3 \cdot 4^x \cdot 8^2 = 16^3$

$2^3 \cdot 2^{2x} \cdot 2^{3(2)} = 2^{4(3)}$

$2^{3+2x+6} = 2^{12}$

$2^{2x+9} = 2^{12}$

$2x + 9 = 12$

$2x = 3$

$x = 3/2$

13) $e^{-9x} = 2.2$

$\ln e^{-9x} = \ln 2.2$

$-9x = \ln 2.2$

$x = \frac{\ln 2.2}{-9} \rightarrow \boxed{x \approx -.0876}$

14) $6^{-.2x} - 3 = 7$

$6^{-.2x} = 10$

$\log 6^{-.2x} = \log 10$

$-.2x \log 6 = \log 10$

$-.2x = \frac{\log 10}{\log 6}$

$-.2x = 1.285$

$x = -6.425$

15) $e^{.08t} = .3$

$\ln e^{.08t} = \ln .3$

$\frac{.08t}{.08} = \frac{\ln .3}{.08}$

$t \approx -15.05$

16) $2^3 \cdot 2^4 = 2^x$

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

$7 = x$

17) $\log_4 (x+3) = -2$

$4^{-2} = x+3$

$\frac{1}{16} = x+3$

$\frac{1}{16} - 3 = x$

$\frac{-47}{16} = x$

18) $\log_4 (x+6) + \log_4 x = 2$

$\log_4 x(x+6) = 2$

$4^2 = x(x+6)$

$16 = x^2 + 6x$

$0 = x^2 + 6x - 16$

$0 = (x+8)(x-2)$

$x = -8, x = 2$

Check!!

only $x=2$ is a solution!

19) $\ln(x+7) = \ln(3x-5)$

$x+7 = 3x-5$

$-2x = -12$

$x = 6$ checks ✓

20) $\log_2(-x) + \log_2(x+12) = 5$

$\log_2(-x)(x+12) = 5$

$2^5 = -x(x+12)$

Check!

$32 = -x^2 - 12x$

$x^2 + 12x + 32 = 0$

$(x+8)(x+4) = 0$

$x = -8 \quad x = -4$

21) $7\log_5(x) - 3 = 15$

$7\log_5(x) = 18$

$\log_5 x = 18/7$

$5^{18/7} = x$

$62.712 \approx x$

22) $y = \log_8 x + 1$

$x = \log_8 y + 1$

$x - 1 = \log_8 y$

$8^{x-1} = 8^{\log_8 y}$

$8^{x-1} = y$

23) $y = e^{x+2} + 3$

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

$x - 3 = e^{y+2}$

$\ln(x-3) = \ln e^{y+2}$

$\ln(x-3) = y + 2$

$\ln(x-3) - y = y$

Essay

1) Inverses of each other

$y = 3^x$ $\quad$ $x = 3^y$

$\log_3 x = y$

2) Yes $5^x = 20$

$\log 5^x = \log 20$

$x \log 5 = \log 20$

$x = \log 20 / \log 5 \approx 1.86$

$5^x = 20$

$\ln 5^x = \ln 20$

$x \ln 5 = \ln 20$

$x = \frac{\ln 20}{\ln 5} = 1.86$

because it is a fraction! Cannot follow ineq → use test pt

* Extra problems: #24 + 25 on revised version

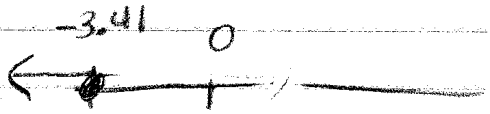
3) $\left(\frac{2}{3}\right)^x \geq 4$

$\log\left(\frac{2}{3}\right)^x = \log 4$

$x \cdot \log\left(\frac{2}{3}\right) = \log 4$

$x = \frac{\log 4}{\log(2/3)}$

$x = -3.41$



$(-\infty, -3.41)$

Test $x = 0$

$\left(\frac{2}{3}\right)^0 \geq 4$

$1 \not\geq 4$

4) $-.5 \log_3 x + 5 \leq 4.5$

$\frac{-.5}{-.5}\log_3 x \leq \frac{-.5}{-.5}$

$\log_3 x \geq 1$

$3^1 = x$

$3 = x$

Test 1

$-.5 \log_3(1) + 5 \leq 4.5$

$0 + 5 \not\leq 4.5$

$[3, \infty)$

$y = \log_2(y+5)$

Pierson

2/26: Sec 5.2 p. 266 (1-18)
p. 280 (1-25)

$2^x = 2^{\log_2(y+5)}$

$2^x - 5 = y$

Garrett:

3/1: Quiz over 5.1 - 5.4 (Monday)

3/5: Quiz over 5.5 - 5.6 (Thursday)

3/2: pg 287 #4-9, 13-22
pg 288 #25, 26

Incenter (∠ bisec) pythgorean

Centroid (medians) 2/3 rule

$\log_5(x-3) \leq -3$

5^{-3}

$5^{-3} = x-3$

$x = \log_{10}(y+5)$

$\frac{1}{125} = x-3$

$125 = x-3$

$122 = x$

$3.008 = x$

$\left(\frac{3}{4}\right)^{2x+1} \geq 5$

$\frac{x-1}{2} = \ln(y-3)$

$\frac{1}{25} = x-3$

$(-3, 3)$

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

$(0,$

$\frac{x-1}{2} = 2\ln(y-3)$