7.4 – 7.9 Review

1. If $12250 is invested in an account paying 9.6%, how much will be in the account at the end of 10 years if the interest is compounded continuously?

$A = A_0 e^{kt}$

$A = 12250\, e^{0.096 \times 10}$

$= \$31993.28$

2. a) Determine the inverse function of $y = 3^{2x-4} + 1$

$x = 3^{2y-4} + 1$

$x - 1 = 3^{2y-4}$

$\log(x-1) = (2y-4)\log 3$

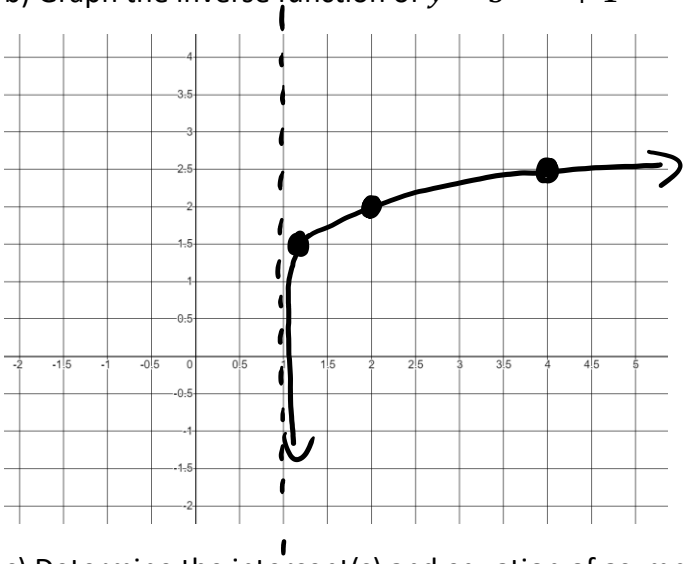
$\frac{\log(x-1)}{\log 3} = 2y - 4$

$\log_3(x-1) = 2y - 4$

$\log_3(x-1) + 4 = 2y$

$y = \frac{1}{2}\log_3(x-1) + 2$

b) Graph the inverse function of $y = 3^{2x-4} + 1$



inverse is $y = \frac{1}{2}\log_3(x-1) + 2$

x	y
1/3	-1
1	0
3	1

$x+1$, $\frac{1}{2}y+2$

x	y
4/3	1.5
2	2
4	2.5

c) Determine the intercept(s) and equation of asymptote for the graph.

No y-int.

V.A. $x = 1$

$0 = \frac{1}{2}\log_3(x-1) + 2$

$-2 = \frac{1}{2}\log_3(x-1)$

$-4 = \log_3(x-1)$

$3^{-4} = x - 1$

$\frac{1}{81} = x - 1$

$x = \frac{82}{81}$

x-int: $\frac{82}{81}$

3. Simplify

a) $\log_b x^{\log_x a}$

$= \log_x a \cdot \log_b x = \frac{\log a}{\log b}$

$= \frac{\log a}{\log x} \cdot \frac{\log x}{\log b} = \log_b a$

b) $\frac{\log x^3 + \log x^5}{\log x^6 - \log x^3}$

$= \frac{3\log x + 5\log x}{6\log x - 3\log x}$

$= \frac{8\log x}{3\log x} = \frac{8}{3}$

4. Solve.

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

$\log_5[(2x-1)(x-2)] = \log_5 5$

$(2x-1)(x-2) = 5$

$2x^2 - 4x - x + 2 = 5$

$2x^2 - 5x - 3 = 0$

$(2x+1)(x-3) = 0$

$x = -\frac{1}{2}, 3$

b) $2^{3x} = 5^{-x-1}$

$\log 2^{3x} = \log 5^{-x-1}$

$3x\log 2 = (-x-1)\log 5$

$3x\log 2 = -x\log 5 - \log 5$

$3x\log 2 + x\log 5 = -\log 5$

$x(3\log 2 + \log 5) = -\log 5$

$x = \frac{-\log 5}{3\log 2 + \log 5}$

5. If $\log_6 x = 120$, *then what is* $\log_6\left(\frac{1}{36}x\right)$?

$\log_6\left(\frac{1}{36}x\right)$

$= \log_6 \frac{1}{36} + \log_6 x$

$= \log_6 6^{-2} + \log_6 x$

$= -2\log_6 6 + 120$

$-2 + 120$

$= 118$

6. Jimmy is making a loan of $5000 with 5% annual interest compounded monthly to go on a summer vacation. He is able to pay back $250 a month, how many months does it take to pay back the loan?

$5000 = \frac{250\left(1 - \left(1 + \frac{0.05}{12}\right)^{-n}\right)}{\frac{0.05}{12}}$

$0.08\bar{3} = 1 - \left(1 + \frac{0.05}{12}\right)^{-n}$

$0.91\bar{6} = \left(1 + \frac{0.05}{12}\right)^{-n}$

$\log 0.91\bar{6} = -n \log\left(1 + \frac{0.05}{12}\right)$

$-n = \frac{\log 0.91\bar{6}}{\log\left(1 + \frac{0.05}{12}\right)}$

$n = 20.9$

21 months