

These problems represent a review of the content that will be covered by the second exam. The answers are available as a pdf at <http://alex.knaust.info/pltlfall2011/>

1. For the following functions, find their domain, horizontal, vertical and slant asymptotes, holes, as well as  $x$  and  $y$  intercepts. Use that information to sketch a graph of the function

a)  $f(x) = \frac{x^2 - 5x + 4}{x^2 - 16}$       b)  $v(t) = \frac{t^2 - t - 2}{t^3 - 2t^2 - 5t + 6}$       c)  $h(x) = \frac{4x}{x^2 + 4}$

2. Graph the following functions

a)  $f(x) = \log_3(x - 4) + 2$       b)  $f(x) = e^{x+3} - 5$

3. Simplify the following equations into one logarithmic or exponential expression

a)  $\log_3 x + 2 \log_3 x$       b)  $e^9 \cdot e^x$       c)  $\ln 19 - \ln x$       d)  $\frac{2^{x-3}}{4^3}$       e)  $\frac{\ln(4x)}{\ln(5)}$

4. Solve for  $x$  in the following equations

a)  $2^{x-3} = 32$       b)  $e^{2x} - 6e^x + 8 = 0$       c)  $\ln x - \ln 3 = 2$

d)  $\ln \sqrt{x+8} = 3$       e)  $\log_6(x+2) - \log_6 x = \log_6(x+5)$

5. Solve the following systems of equations using **Gauß-Jordan** elimination

a) 
$$\begin{cases} 2x - y + 3z = 24 \\ 2y - z = 14 \\ 7x - 5y = 6 \end{cases}$$
      b) 
$$\begin{cases} 8x - 4y = 7 \\ 5x + 2y = 1 \end{cases}$$

6. Solve the following systems of equations

a) 
$$\begin{cases} 3x - 2y + z = 15 \\ -x + y + 2z = -10 \\ x - y - 4z = 14 \end{cases}$$
      b) 
$$\begin{bmatrix} -1 & 0 & -3 \\ 3 & -3 & -2 \\ 2 & 5 & 1 \end{bmatrix} \cdot \begin{bmatrix} x_1 \\ x_2 \\ x_3 \end{bmatrix} = \begin{bmatrix} -1 \\ 6 \\ 2 \end{bmatrix}$$

7. Perform partial fraction decomposition on the following expressions

a)  $\frac{1}{x^2+x}$       b)  $\frac{x^4}{(x-1)^3}$       c)  $\frac{x^2-4x+7}{(x+1)(x^2-2x+3)}$

8. For the following matrices

$$A = \begin{bmatrix} 1 & 0 & 2 \\ 2 & 1 & 6 \\ -4 & 2 & -3 \end{bmatrix}$$
      
$$B = \begin{bmatrix} 2 & 1 \\ 1 & 4 \end{bmatrix}$$
      
$$C = \begin{bmatrix} 1 & 2 \\ -1 & 3 \\ 9 & 0 \end{bmatrix}$$
      
$$D = \begin{bmatrix} 3 & 9 \\ -5 & 4 \end{bmatrix}$$

Find a)  $3B - 2D$       b)  $A \cdot C$       c)  $C \cdot B$       d)  $B^{-1}$       e)  $D^{-1}$       f)  $B \cdot D$       g)  $\det(B)$