Tutorial Session 1

1. Section 1.5 exercises 21 and 22

2. Section 2.1 exercises 30 , 31 , 37 , 39

3. Describe the domain of the function $y = \frac{\sqrt{x}+1}{1-\sqrt{1-x^2}}$.

4. Plot the graph of the function $y = x + |x^2 - 4x + 3|$.

   Hint: Decompose x^2-4x+3 into linear factors and then determine the sign of x^2-4x+3 over the real line.

5. (challenging) Find the value(s) of k such that the function

$$f(x) = \begin{cases} \frac{\sqrt{1+kx}-1}{x} & x < 0 \\ (x-k)^2 + \frac{k}{2} - 1 & x > 0 \end{cases}$$

   has a limit at the point $x = 0$.

6. Find the limits

$$\lim_{x \to -2} \frac{\sqrt[3]{x-6}+2}{x^3+8}$$

   by finding factors of $(x + 2)$ in both the numerator and denominator.

7. Consider the function

$$y = \frac{1+\sqrt{x}}{1-\sqrt{x}} \qquad 0 \leq x < 1$$

   Find $f^{-1}(x)$. What is the domain of f^{-1} ?.

8. Consider the function

$$y = \frac{1+\sqrt{1-x^2}}{1-\sqrt{1-x^2}} \qquad -1 < x < 0$$

   (Be careful about the domain!). Find the $f^{-1}(x)$. What is the domain of f^{-1} ?.