

Problem Set 0

The purpose of this problem set is to become familiar with the use of Maple, Mathematica, or Wolfram Alpha as a tool for analyzing mathematically complex problems. Choose one of the tools to visualize and solve the following problems.

1. Numerically find the values of x which satisfy the following equation.

$$\begin{aligned} & \text{[} > x^3 - x^2 = 7 \\ & \qquad \qquad \qquad x^3 - x^2 = 7 \end{aligned} \tag{1}$$

Use graphics to help visualize the problem.

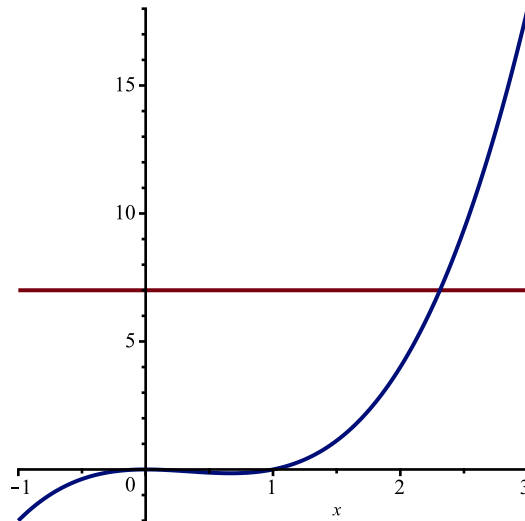
2. Find the following integral as a function of x .

$$\begin{aligned} & \text{[} > g := x \rightarrow \text{int}(\exp(-s^2), s = 0 .. x) \\ & \qquad \qquad \qquad g := x \mapsto \int_0^x e^{-s^2} ds \end{aligned} \tag{2}$$

Use graphics to help you visualize the integrand and the integral.

- 1.

$$\text{[} > \text{plot}(\{x^3 - x^2, 7\}, x = -1 .. 3);$$



$$\begin{aligned} & \text{[} > \text{fsolve}(x^3 - x^2 = 7, x = 2.5) \\ & \qquad \qquad \qquad 2.310852163 \end{aligned} \tag{3}$$

Here we see that there is one solution for the equation which is $x = 2.310852163$

2. We can use maple to evaluate the integral

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$g := x \rightarrow \text{int}(\exp(-s^2), s = 0..x)$

$g := x \mapsto \int_0^x e^{-s^2} ds$

(4)

>

$g(x)$

$\frac{\sqrt{\pi} \operatorname{erf}(x)}{2}$

(5)

$plot(\{\exp(-u^2), g(u)\}, u = 0..3)$

