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.

\[
x^3 - x^2 = 7
\]

Use graphics to help visualize the problem.

2. Find the following integral as a function of \( x \).

\[
g := x \rightarrow \int_0^x e^{-s^2} \, ds
\]

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

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1. 

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

\[
> \text{fsolve}(x^3 - x^2 = 7, x = 2.5) \\
\begin{array}{c}
2.310852163
\end{array}
\]

Here we see that there is one solution for the equation which is \( x = 2.310852163 \).

\[
> g := x \rightarrow \int (\exp(-s^2), s = 0..x) \\
\begin{array}{c}
g := x \mapsto \int_0^x e^{-s^2} \, ds
\end{array}
\]

\[
> g(x) \\
\begin{array}{c}
\frac{\sqrt{\pi} \, \text{erf}(x)}{2}
\end{array}
\]

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