

Example HOMEWORK for PHY 711

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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. $g(x) = \int_0^x (\exp(-s^2))$. Use graphics to help you visualize the integrand and the integral.

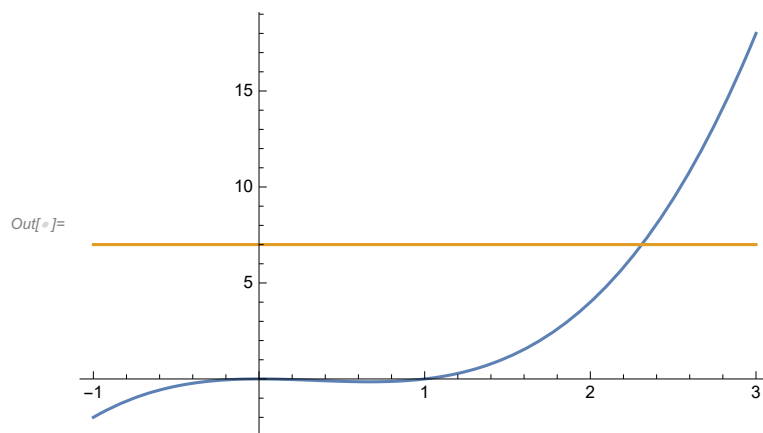
`In[ ]:= Solve[x^3 - x^2 == 7, x]`
□

`Out[ ]:=` $\left\{ \left\{ \left\{ x \rightarrow \frac{1}{3} \left(1 + \left(\frac{191}{2} - \frac{3\sqrt{4053}}{2} \right)^{1/3} + \left(\frac{1}{2} \left(191 + 3\sqrt{4053} \right) \right)^{1/3} \right) \right\}, \right. \right.$
 $\left. \left\{ x \rightarrow \frac{1}{3} - \frac{1}{6} \left(1 + i\sqrt{3} \right) \left(\frac{191}{2} - \frac{3\sqrt{4053}}{2} \right)^{1/3} - \frac{1}{6} \left(1 - i\sqrt{3} \right) \left(\frac{1}{2} \left(191 + 3\sqrt{4053} \right) \right)^{1/3} \right\}, \right.$
 $\left. \left\{ x \rightarrow \frac{1}{3} - \frac{1}{6} \left(1 - i\sqrt{3} \right) \left(\frac{191}{2} - \frac{3\sqrt{4053}}{2} \right)^{1/3} - \frac{1}{6} \left(1 + i\sqrt{3} \right) \left(\frac{1}{2} \left(191 + 3\sqrt{4053} \right) \right)^{1/3} \right\} \right\}, \{\square\}$

`In[ ]:= NSolve[x^3 - x^2 == 7, x]`
□

`Out[ ]:=` $\left\{ \left\{ \left\{ x \rightarrow -0.655426 - 1.61233 i \right\}, \left\{ x \rightarrow -0.655426 + 1.61233 i \right\}, \left\{ x \rightarrow 2.31085 \right\} \right\}, \{\square\} \right\}$

`In[ ]:= Plot[{x^3 - x^2, 7}, {x, -1, 3}]`



```
In[ ]:= g[x] = Integrate[exp[-s^2], {s, 0, Infinity}]
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$$\text{Out[]} = \int_0^{\infty} \exp[-s^2] \, ds$$