```
In[1]:= Sin[Pi]

Out[1]= 0

In[2]:= Sin[Pi / 4]
```

Out[2]= $\frac{1}{\sqrt{2}}$

```
In[3]:= Sin[1.0]

Out[3]= 0.841471

In[4]:= Sin[1]

Out[4]= Sin[1]

In[7]:= N[Sin[1], 20]

Out[7]= 0.84147098480789650665

In[8]:= {N[Sin[1], 20], N[Sin[1.], 20]}

Out[8]= {0.84147098480789650665, 0.841471}
```

In[18]:= Expand[(1 + x)^22, x]

Out[18]= $1+22x+231x^2+1540x^3+7315x^4+26\,334x^5+74\,613x^6+170\,544x^7+319\,770x^8+497\,420x^9+646\,646x^{10}+705\,432x^{11}+646\,646x^{12}+497\,420x^{13}+319\,770x^{14}+170\,544x^{15}+74\,613x^{16}+26\,334x^{17}+7315x^{18}+1540x^{19}+231x^{20}+22x^{21}+x^{22}$

In[19]:= Factor[%]

Out[19]= $(1+x)^{22}$

In[21]:= Factor[x^2 - 2]

Out[21]= $-2+x^2$

In[22]:= Factor[x^2 - 2, Extension → $\sqrt{2}$]

Out[22]= $-\left(\sqrt{2}-x\right)\left(\sqrt{2}+x\right)$

In[23]:= Factor[x^2 - 2.]

Out[23]= 1. (-1.41421 + x) (1.41421 + x)

In[24]:= Factor[x^3 + 1]

Out[24]= $(1+x)\left(1-x+x^2\right)$

In[25]:= Factor[x^3 + 1, Extension → {i, $\sqrt{3}$}]

Out[25]= $\frac{1}{4}\left(i+\sqrt{3}-2ix\right)\left(-i+\sqrt{3}+2ix\right)(1+x)$

In[27]:= Solve[x^2 + 5 x + 3 == 0, x]

Out[27]= $\left\{\left\{x\to\frac{1}{2}\left(-5-\sqrt{13}\right)\right\},\left\{x\to\frac{1}{2}\left(-5+\sqrt{13}\right)\right\}\right\}$

In[28]:= x1 = x /. %[[2]]

Out[28]= $\frac{1}{2}\left(-5+\sqrt{13}\right)$

In[29]:= **x2 = x /. %%[[1]]**

Out[29]= $\frac{1}{2}\left(-5-\sqrt{13}\right)$

In[30]:= **D[x^x, x]**

Out[30]= $x^x\ (1 + \text{Log}[x])$

In[31]:= **$\int$% dx**

Out[31]= x^x

In[32]:= **Integrate[%%, x]**

Out[32]= x^x

In[33]:= **v = {1, 4.2, 67}**

Out[33]= {1, 4.2, 67}

In[34]:= **(* Vektor *)**

In[35]:= **Solve[{x + 2 y == 0, 3 x + 4 y == 1}, {x, y}]**

Out[35]= $\left\{\left\{x \to 1,\ y \to -\frac{1}{2}\right\}\right\}$

In[36]:= **A = {{1, 2}, {3, 4}}**

Out[36]= {{1, 2}, {3, 4}}

In[37]:= **MatrixPower[A, 20]**

Out[37]= {{95 799 031 216 999, 139 620 104 992 450}, {209 430 157 488 675, 305 229 188 705 674}}

In[38]:= **MatrixForm[A]**

Out[38]//MatrixForm=

$$\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix}$$

In[39]:= **MatrixForm[%%]**

Out[39]//MatrixForm=

$$\begin{pmatrix} 95\,799\,031\,216\,999 & 139\,620\,104\,992\,450 \\ 209\,430\,157\,488\,675 & 305\,229\,188\,705\,674 \end{pmatrix}$$

In[40]:= **MatrixPower[MatrixForm[A], 20]**

Out[40]= $\text{MatrixPower}\left[\begin{pmatrix} 1 & 2 \\ 3 & 4 \end{pmatrix},\ 20\right]$

In[41]:= **(* Kann nicht ausgewertet werden, da falsche Form! *)**

In[50]:= **{b = {0, 1}, x = {x2, x1}};**

In[51]:= `Solve[A.x == b, x]`

General::ivar : $\frac{1}{2}\left(-5+\sqrt{13}\right)$ is not a valid variable. ≫

General::ivar : $\frac{1}{2}\left(-5+\sqrt{13}\right)$ is not a valid variable. ≫

Out[51]= $\text{Solve}\left[\text{False}, \left\{\frac{1}{2}\left(-5-\sqrt{13}\right), \frac{1}{2}\left(-5+\sqrt{13}\right)\right\}\right]$

In[52]:= `Clear[x]`

In[53]:= `Series[Exp[x], {x, 0, 5}]`

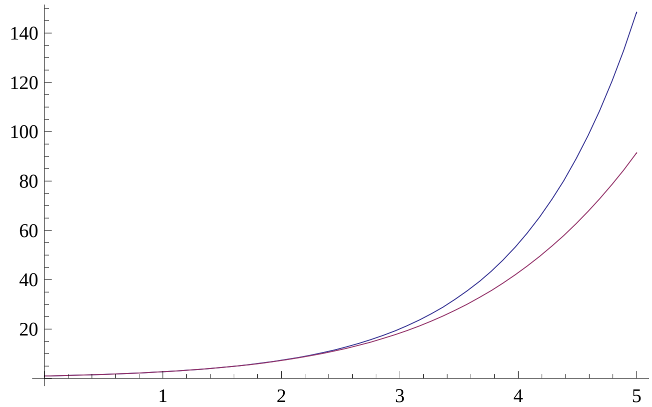
Out[53]= $1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \frac{x^5}{120} + O[x]^6$

In[54]:= `f[x_] = Normal[%]`

Out[54]= $1 + x + \frac{x^2}{2} + \frac{x^3}{6} + \frac{x^4}{24} + \frac{x^5}{120}$

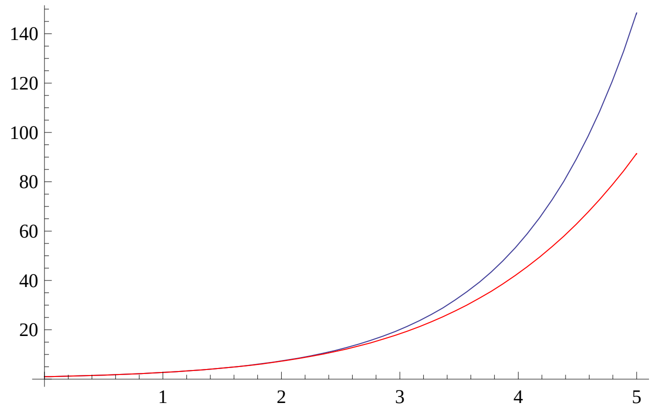
In[55]:= `Plot[ {Exp[x], f[x]}, {x, 0, 5}]`

Out[55]=



In[56]:= `Plot[ {Exp[x], f[x]}, {x, 0, 5}, PlotStyle → {{}, RGBColor[1, 0, 0]}]`

Out[56]=



In[57]:= $\int_0^1 x\char`^3 \, dx$

Out[57]= $\frac{1}{4}$

In[58]:= `D[x^x, {x, 4}]`

Out[58]= $2\,x^{-2+x} + \left(-\frac{-1+x}{x^2} + \frac{2}{x}\right) x^{-1+x} + 3\,x^{-1+x}\,(1+\text{Log}[x])^2 + x^x\,(1+\text{Log}[x])^4 + 2\,x^{-1+x}\,(1+\text{Log}[x])\left(\frac{-1+x}{x} + \text{Log}[x]\right) + x^{-1+x}\left(\frac{-1+x}{x} + \text{Log}[x]\right)^2$

In[59]:= $\int \%\, dx$

Out[59]= $x^x\left(\frac{-1+3\,x+x^2}{x^2} + \frac{3\,(1+x)\,\text{Log}[x]}{x} + 3\,\text{Log}[x]^2 + \text{Log}[x]^3\right)$

In[60]:= $\int \%\, dx$

Out[60]= $x^x\left(\frac{1+x}{x} + 2\,\text{Log}[x] + \text{Log}[x]^2\right)$

In[61]:= $\int \%\, dx$

Out[61]= $x^x\,(1+\text{Log}[x])$

In[62]:= $\int \%\, dx$

Out[62]= x^x

In[63]:= `DSolve[y''[x] + 2 y'[x] + 2 y[x] == 0, y[x], x]`

Out[63]= $\{\{y[x] \to e^{-x}\,C[2]\,\text{Cos}[x] + e^{-x}\,C[1]\,\text{Sin}[x]\}\}$

In[64]:= `DSolve[{y''[x] + 2 y'[x] + 2 y[x] == 0, y[0] == 1, y'[0] == 0}, y[x], x]`

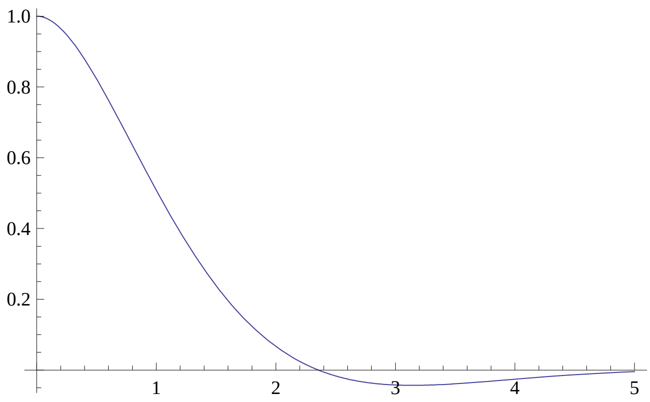
Out[64]= $\{\{y[x] \to e^{-x}\,(\text{Cos}[x] + \text{Sin}[x])\}\}$

In[65]:= `f1[x_] = y[x] /. %[[1]]`

Out[65]= $e^{-x}\,(\text{Cos}[x] + \text{Sin}[x])$

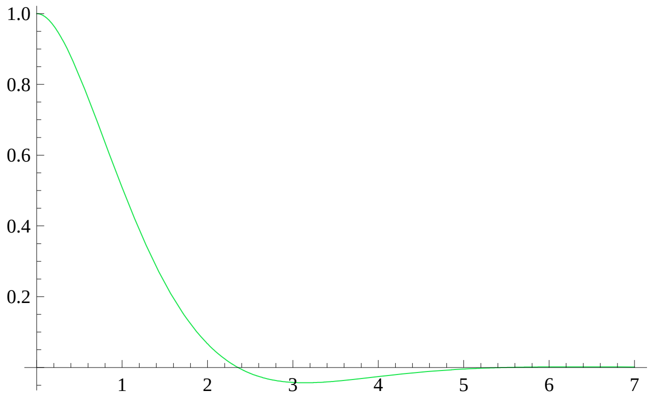
In[66]:= `Plot[f1[x], {x, 0, 5}]`

Out[66]=



In[76]:=
```
Plot[f1[x], {x, 0, 7}, PlotStyle → RGBColor[.1, .9, .3]]
```

Out[76]=



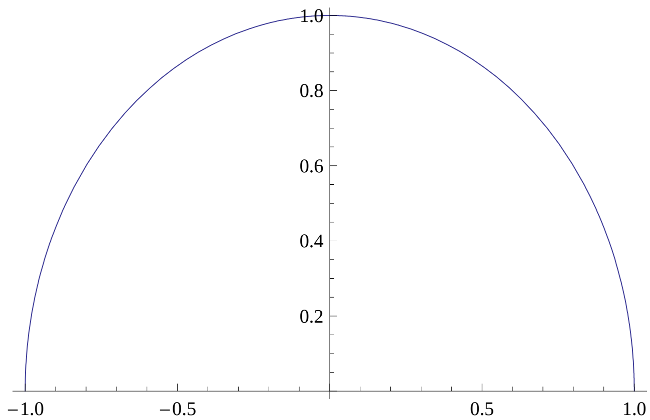
In[77]:=
```
ConstrainedMin[x - y - z, {y + z < 3, x > 7}, {x, y, z}]
```

ConstrainedMin::deprec : ConstrainedMin is deprecated and will not be supported in future versions of Mathematica. Use NMinimize or Minimize instead. ≫

Out[77]=
```
{4, {x → 7, y → 3, z → 0}}
```

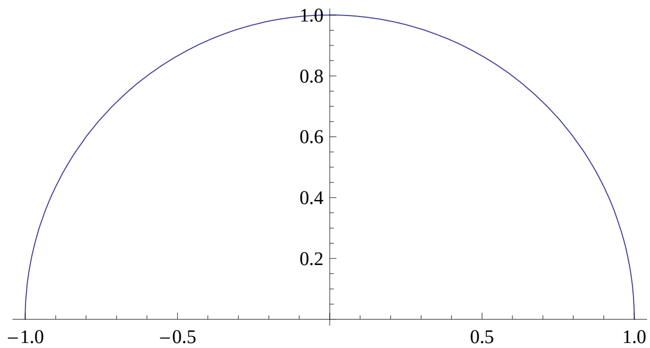
In[79]:=
```
Plot[√(1 - x^2), {x, -1, 1}]
```

Out[79]=



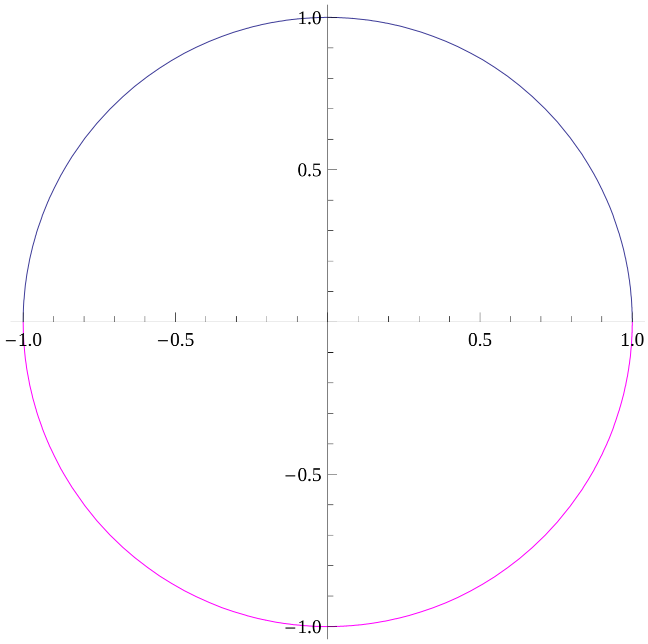
In[80]:=
```
Plot[√(1 - x^2), {x, -1, 1}, AspectRatio → Automatic]
```

Out[80]=



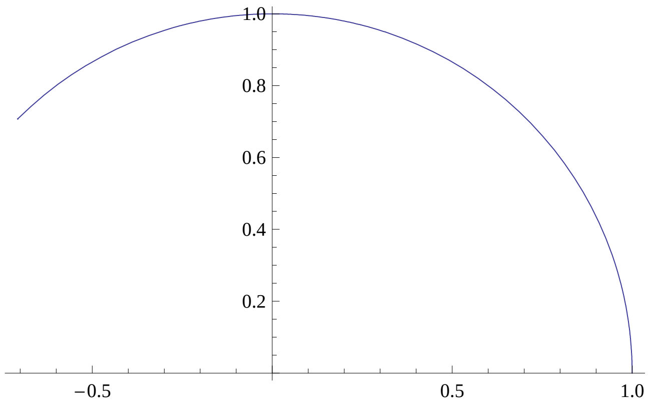
In[86]:= `Plot[{√(1 - x^2), -√(1 - x^2)}, {x, -1, 1}, {AspectRatio → Automatic, PlotStyle → {{}, RGBColor[1, 0, 1]}}]`

Out[86]=



In[91]:= `q1 = ParametricPlot[{Cos[t], Sin[t]}, {t, 0, 3/4 π}]`

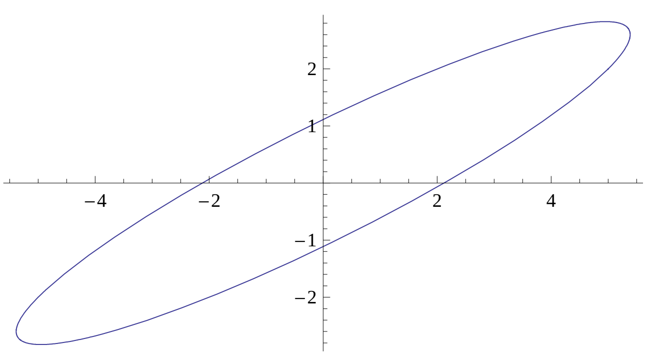
Out[91]=



In[87]:= `Clear[A]`

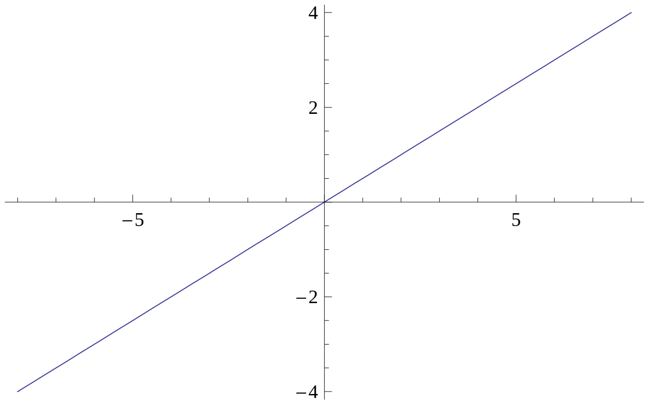
In[88]:= `A = {{5, 2}, {2, 2}};`

In[90]:= `q2 = ParametricPlot[A.{Cos[t], Sin[t]}, {t, 0, 2 π}]`



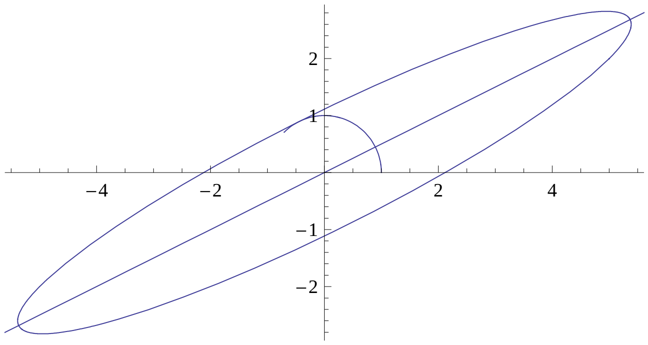
```
In[96]:= q3 = Plot[t / 2, {t, -8, 8}]
```

Out[96]=




```
In[97]:= Show[q2, q1, q3]
```

Out[97]=




```
In[94]:= Eigenvalues[A]
```

```
Out[94]= {6, 1}
```

```
In[95]:= Eigenvectors[A]
```

```
Out[95]= {{2, 1}, {-1, 2}}
```

```
In[107]:= Plot[x^2, {x, -2, 2},
           AxesLabel → {"unsinnige Abszisse", "unsinnige Ordinate"}, PlotRange → {-2, 2}]
```

Out[107]=