In[ ]:=
```
DSolve[y''[x] - y'[x] - 6 y[x] == 0, y[x], x]
```

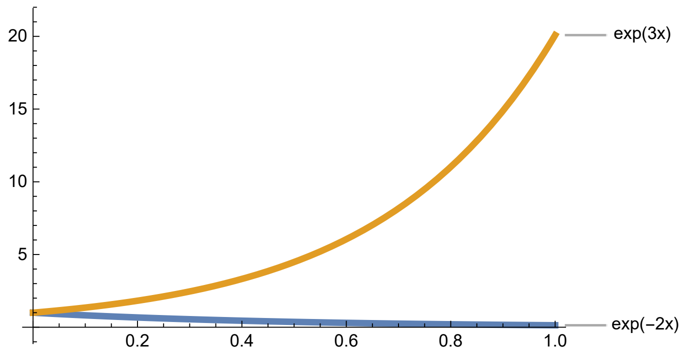
Out[ ]= $\{\{y[x] \to e^{-2x} c_1 + e^{3x} c_2\}\}$

In[ ]:=
```
p1 = Exp[-2 x]
p2 = Exp[3 x]
Plot[ {p1, p2}, {x, 0, 1}, PlotLabels → {"exp(-2x)", "exp(3x)"},
 PlotStyle → {Thickness[0.012], Thickness[0.012]}]
```

Out[ ]= e^{-2x}

Out[ ]= e^{3x}

Out[ ]=



In[ ]:=
```
sol = y''[x] + 9 y[x] == 0
sol1 = DSolve[sol, y[x], x]
```

Out[ ]= $9 y[x] + y''[x] == 0$

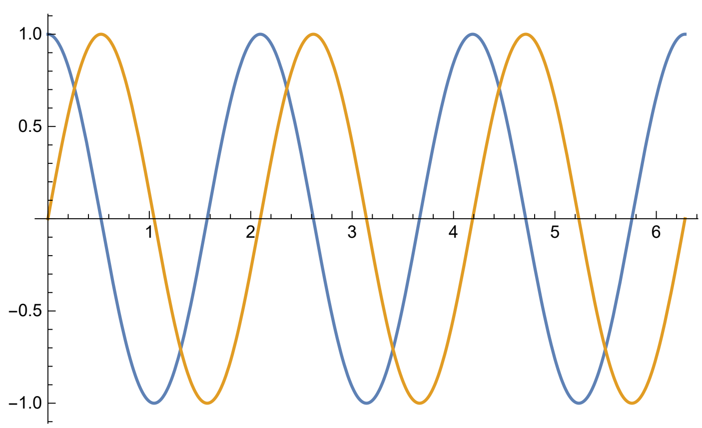
Out[ ]= $\{\{y[x] \to c_1 \text{Cos}[3 x] + c_2 \text{Sin}[3 x]\}\}$

In[ ]:=
```
p3 = Cos[3 x]
p4 = Sin[3 x]
Plot[{p3, p4}, {x, 0, 2 Pi}]
```

Out[ ]= Cos[3 x]

Out[ ]= Sin[3 x]

Out[ ]=



In[•]:=
```
eqn = T''[t] == U (T[t] - A)
DSolve[eqn, T[t], t]
```

In[•]:=
```
Plot[{Exp[t] + Exp[-t]}, {t, 0, 1}]
```

In[•]:=
```
sol = y''[x] - 10 y'[x] + 25 y[x] == 30 x + 3
DSolve[sol, y[x], x]
sol1 = 0.6 (1 + 2 x) + Exp[5 x] + x * Exp[5 x]
```
$$\int_0^x (x - s)\ \mathrm{Exp}[5\ (x - s)] * (30\ s + 3)\ ds$$
```
Plot[sol1, {x, -4, 1}, PlotRange → {-3, 3},
 PlotLabel → "0.6(1+2x)+Exp[5x]+x*Exp[5x]", PlotStyle → Thickness[0.012]]


sol2 = y''[x] - 8 y'[x] + 20 y[x] == 100 x^2 - 26 x * Exp[x]
sol3 = DSolve[sol2, y[x], x]
```
$$\left\{\left\{y[x] \to e^{4x}\, c_2\, \mathrm{Cos}[2x] + e^{4x}\, c_1\, \mathrm{Sin}[2x] - \frac{1}{130}\left(-143 + 120\, e^x - 520\, x + 260\, e^x\, x - 650\, x^2\right)\left(\mathrm{Cos}[2x]^2 + \mathrm{Sin}[2x]^2\right)\right\}\right\}$$
```
Plot[y == Cos[x]^2 + Sin[x]^2, {x, 0, 1}]
```

In[•]:=
$$\frac{1}{2}\int_0^x \mathrm{Exp}[4\ (x - s)] * \mathrm{Sin}[2\ (x - s)] * (100\ s\verb|^|2 - 26\ s * \mathrm{Exp}[s])\ ds$$
$$\frac{1}{2}\left(\frac{11}{5} - \frac{24\, e^x}{13} + 8\, x - 4\, e^x\, x + 10\, x^2 - \frac{23}{65}\, e^{4x}\, \mathrm{Cos}[2x] - \frac{24}{65}\, e^{4x}\, \mathrm{Sin}[2x]\right)$$

Out[•]= False

In[•]:=

$$\frac{1}{8} \times \int_0^x 2 * \mathrm{Exp}[4\ s] * (\mathrm{Exp}[4\ (x - s)] - \mathrm{Exp}[-4\ (x - s)])\ ds$$

Out[•]= $\frac{1}{8}\left(2\, e^{4x}\, x - \frac{1}{2}\, \mathrm{Sinh}[4x]\right)$

In[•]:= $\mathrm{Evaluate}\left[2\, e^{4x}\, x - \frac{1}{2}\, \mathrm{Sinh}[4x]\right]$

Out[•]= $2\, e^{4x}\, x - \frac{1}{2}\, \mathrm{Sinh}[4x]$

In[•]:= $\frac{1}{2}\left(-1 + e^{4x}\right)^2 === \frac{1}{8}\left(2 * \mathrm{Exp}[4x] * x - \frac{1}{4}\ (\mathrm{Exp}[4x] - \mathrm{Exp}[-4x])\right)$

Out[•]= False

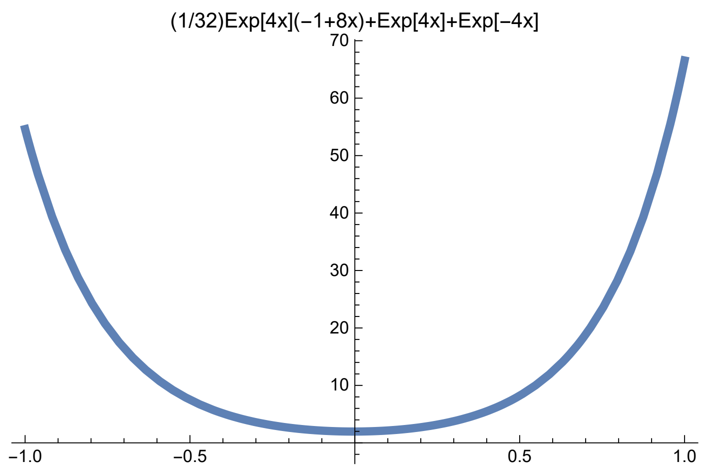
```
sol4 = y''[x] - 16 y[x] == 2 Exp[4 x]
DSolve[sol4, y[x], x]
sol5 = (1/32) Exp[4 x] (-1 + 8 x) + Exp[4 x] + Exp[-4 x]
Plot[sol5, {x, -1, 1}, PlotStyle → Thickness[0.012],
 PlotLabel → "(1/32) Exp[4x] (-1+8x) +Exp[4x]+Exp[-4x]"]
```

Out[∘]= $-16\, y[x] + y''[x] == 2\, e^{4x}$

Out[∘]= $\left\{\left\{y[x] \to \frac{1}{32} e^{4x} (-1 + 8x) + e^{4x} c_1 + e^{-4x} c_2\right\}\right\}$

Out[∘]= $e^{-4x} + e^{4x} + \frac{1}{32} e^{4x} (-1 + 8x)$

Out[∘]=



In[∘]:=

```
∫_0^x Sin[x - s] 2 s * Sin[s] ds
sol8 = y''[x] + y[x] == 2 x * Sin[x]
DSolve[sol8, y[x], x]


∫_0^x (Exp[x - s] * Sin[x - s] (Exp[2 s] * (Cos[s] - 3 Sin[s]))) ds
sol7 = y''[x] - 2 y'[x] + 2 y[x] == Exp[2 x] * (Cos[x] - 3 Sin[x])
DSolve[sol7, y[x], x]
```

Out[∘]= $-\frac{1}{2} x (x \operatorname{Cos}[x] - \operatorname{Sin}[x])$

Out[∘]= $y[x] + y''[x] == 2\, x \operatorname{Sin}[x]$

Out[∘]= $\left\{\left\{y[x] \to c_1 \operatorname{Cos}[x] + c_2 \operatorname{Sin}[x] + \frac{1}{4} \left(-2 x^2 \operatorname{Cos}[x] + \operatorname{Cos}[x] \operatorname{Cos}[2x] - 2x \operatorname{Cos}[2x] \operatorname{Sin}[x] + 2x \operatorname{Cos}[x] \operatorname{Sin}[2x] + \operatorname{Sin}[x] \operatorname{Sin}[2x]\right)\right\}\right\}$

In[ ]:= $\text{Simplify}\left[\frac{1}{5} e^{x} \left(7 \left(-1 + e^{x}\right) \text{Cos}[x] - \left(6 + e^{x}\right) \text{Sin}[x]\right)\right]$

Out[ ]= $\frac{1}{5} e^{x} \left(7 \left(-1 + e^{x}\right) \text{Cos}[x] - \left(6 + e^{x}\right) \text{Sin}[x]\right)$

$\{\{y[x] \to e^{x} c_2 \text{Cos}[x] + e^{x} c_1 \text{Sin}[x] + \frac{1}{10} e^{2x} (15 \text{Cos}[x] - \text{Cos}[x] \text{Cos}[2x] + 5 \text{Sin}[x] + 7 \text{Cos}[2x] \text{Sin}[x] - 7 \text{Cos}[x] \text{Sin}[2x] - \text{Sin}[x] \text{Sin}[2x])\}\}$

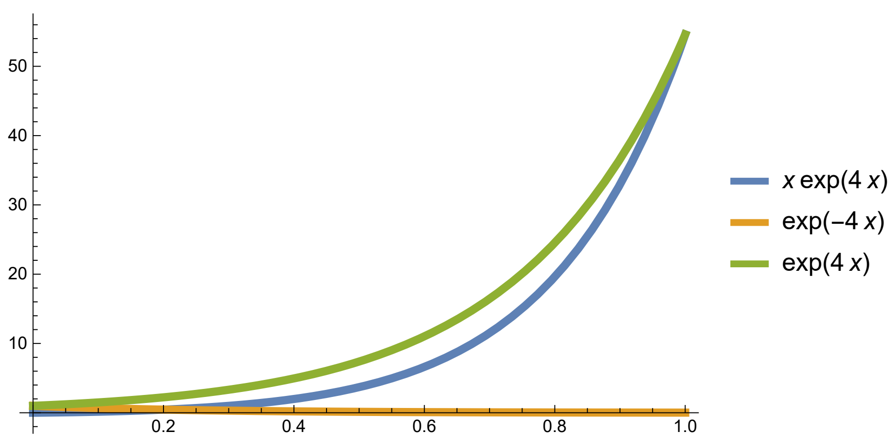
$\frac{1}{8} \times \int_0^x 2 * \text{Exp}[4 s] \, (\text{Exp}[4 (x - s)] - \text{Exp}[-4 (x - s)]) \, ds$

```
sol9 = y''[x] - 16 y[x] == 2 * Exp[4 x]
DSolve[sol9, y[x], x]
Plot[{x * Exp[4 x], Exp[-4 x], Exp[4 x]}, {x, 0, 1},
 PlotStyle → {Thickness[0.012], Thickness[0.012], Thickness[0.012]},
 PlotLegends → "Expressions"]
```

Out[ ]= $\frac{1}{8} \left(2 e^{4x} x - \frac{1}{2} \text{Sinh}[4x]\right)$

Out[ ]= $-16 y[x] + y''[x] == 2 e^{4x}$

Out[ ]= $\left\{\left\{y[x] \to \frac{1}{32} e^{4x} (-1 + 8x) + e^{4x} c_1 + e^{-4x} c_2\right\}\right\}$

Out[ ]= 

In[ ]:=

$\int_0^x \text{Sin}[x - s] * 2 s * \text{Sin}[s] \, ds$

Out[ ]= $-\frac{1}{2} x \left(x \text{Cos}[x] - \text{Sin}[x]\right)$

$-\int_0^x \text{Sin}[2 (x - s)] \, ds$

Out[ ]= $-\text{Sin}[x]^2$

In[ ]:=
```
Log[Exp[4]]
```
Out[ ]= 4

In[ ]:= $\int_0^t (t-s) * \text{Exp}[-t] * \text{Log}[s] \, ds$

In[ ]:= $\frac{1}{4} e^{-t} t^2 (-3 + 2 \text{Log}[t])$

```
sol11 = y''[t] + 2 y'[t] + y[t] == Exp[-t] * Log[t]
DSolve[sol11, y[t], t]
```
Out[ ]= $\frac{1}{4} e^{-t} t^2 (-3 + 2 \text{Log}[t])$

Out[ ]= $y[t] + 2 y'[t] + y''[t] == e^{-t} \text{Log}[t]$

In[ ]:= $\{\{y[t] \to e^{-t} c_1 + e^{-t} t c_2 + \frac{1}{4} e^{-t} t^2 (-3 + 2 \text{Log}[t])\}\}$

$\frac{1}{6} \int_0^t (\text{Exp}[2 (t-s)] - \text{Exp}[-6 (t-s)]) (2 * \text{Exp}[-2 s] - \text{Exp}[-s]) \, ds$

Out[ ]= $\{\{y[t] \to e^{-t} c_1 + e^{-t} t c_2 + \frac{1}{4} e^{-t} t^2 (-3 + 2 \text{Log}[t])\}\}$

In[ ]:= $\frac{1}{180} e^{-6 t} (9 - 30 e^{4 t} + 16 e^{5 t} + 5 e^{8 t})$

$\int_0^t \text{Sin} (i (t-s)) \, ds$

Out[ ]= $\frac{1}{180} e^{-6 t} (9 - 30 e^{4 t} + 16 e^{5 t} + 5 e^{8 t})$

In[ ]:= $\frac{1}{2} i \, \text{Sin} \, t^2$

```
Plot[Exp[-x] + Exp[x], {x, 0, 1}]
```

Out[ ]= $\frac{1}{2} i \, \text{Sin} \, t^2$

```
u = ((Exp[-0.1] * Exp[0.1 x]) + (Exp[0.1] * Exp[-0.1 x])) / (Exp[-0.1] + Exp[0.1])
v = ((Exp[-10] * Exp[10 x]) + (Exp[10] * Exp[-10 x])) / (Exp[-10] + Exp[10])
w = ((Exp[-1] * Exp[x]) + (Exp[1] * Exp[-x])) / (Exp[-1] + Exp[1])
Plot[{u, v, w}, {x, 0, 1},
 PlotStyle → {Thickness[0.012], Thickness[0.012], Thickness[0.012]},
 PlotLegends → "Expressions"]
```

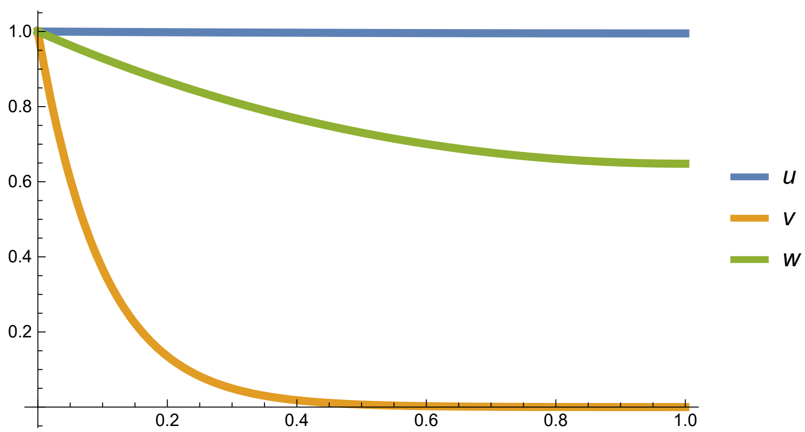
$$\frac{1}{L}\int_0^L u\,dx$$

Out[◦]= $0.49751\left(1.10517\, e^{-0.1\,x} + 0.904837\, e^{0.1\,x}\right)$

Out[◦]= $$\frac{e^{10-10\,x} + e^{-10+10\,x}}{\frac{1}{e^{10}} + e^{10}}$$

Out[◦]= $$\frac{e^{1-x} + e^{-1+x}}{\frac{1}{e} + e}$$

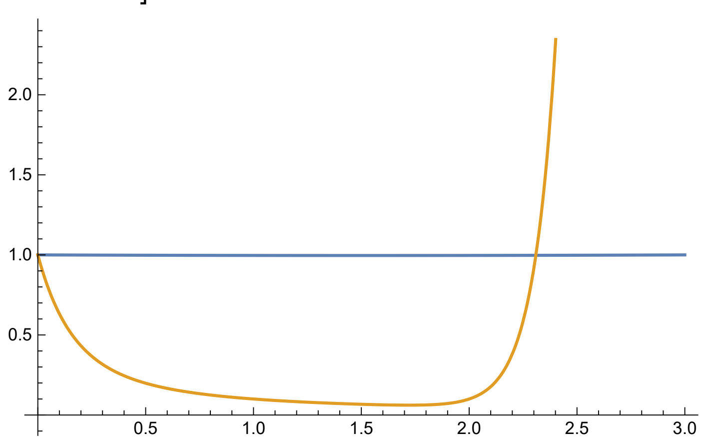
Out[◦]=



In[◦]:= Plot$\left[\left\{\frac{0.996679946249559\grave{} - 5.49833997312478\grave{}\, e^{-0.1\grave{}\,L} + 4.50166002687522\grave{}\, e^{0.1\grave{}\,L}}{L}, \frac{1}{L}\int_0^L v\,dx\right\},\right.$

$\left.\{L, 0, 3\}\right]$

Out[◦]=



In[∘]:=
```
mat = {{1, 5, 3}, {4, 9, 6}, {7, 19, 9}}
mat // MatrixForm
mat1 = {{x}, {y}, {z}}
mat // MatrixForm
mat2 = {{1}, {5}, {9}}
mat // MatrixForm
Solve[mat.mat1 == mat2]
```

Out[∘]= {{1, 5, 3}, {4, 9, 6}, {7, 19, 9}}

Out[∘]//MatrixForm=

$$\begin{pmatrix} 1 & 5 & 3 \\ 4 & 9 & 6 \\ 7 & 19 & 9 \end{pmatrix}$$

Out[∘]= {{x}, {y}, {z}}

Out[∘]//MatrixForm=

$$\begin{pmatrix} 1 & 5 & 3 \\ 4 & 9 & 6 \\ 7 & 19 & 9 \end{pmatrix}$$

Out[∘]= {{1}, {5}, {9}}

Out[∘]//MatrixForm=

$$\begin{pmatrix} 1 & 5 & 3 \\ 4 & 9 & 6 \\ 7 & 19 & 9 \end{pmatrix}$$

Out[∘]= $\left\{\left\{x \to \frac{3}{2}, y \to 0, z \to -\frac{1}{6}\right\}\right\}$

$\left\{\left\{x \to \frac{3}{2}, y \to 0, z \to -\frac{1}{6}\right\}\right\}$

Limit$\left[\frac{\text{Sin}[x]}{x}, x \to 0\right]$

Out[∘]= $\left\{\left\{x \to \frac{3}{2}, y \to 0, z \to -\frac{1}{6}\right\}\right\}$

Out[∘]= 1

In[∘]:=
```
Solve[x^2 + 8 x + 20 == 0, x]

DSolve[{n''[x] + 2 x * n'[x] == 0, n[0] == 1, n[∞] == 0}, n[x], x]
```

Out[∘]= {{x → -4 - 2 ⅈ}, {x → -4 + 2 ⅈ}}

Out[∘]= {{n[x] → 1 - Erf[x]}}

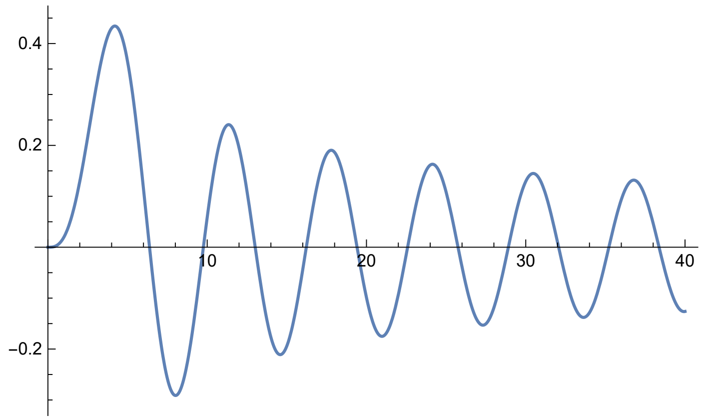
{{x → -4 - 2 ⅈ}, {x → -4 + 2 ⅈ}}

```
n[x/(2*Sqrt[1]) _] == 1 - Erf[x/(2*Sqrt[1])]
Plot[{1 - Erf[x/(2*Sqrt[1])], 1 - Erf[x/(2*Sqrt[10])], 1 - Erf[x/(2*Sqrt[100])]}, {x, 0, 3}]
```

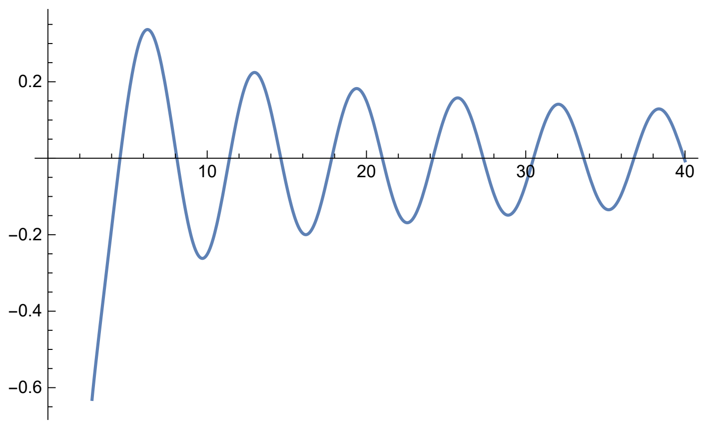
In[◦]:=

```
Plot[BesselJ[3, x], {x, 0, 40}]
Plot[BesselY[3, x], {x, 0, 40}]
```

Out[◦]=



Out[◦]=



In[◦]:=

```
Solve[{{1/600.0, 1/500.0}, {1, 1}}.{{u}, {v}} == {{1200/700}, {1000}}]
{{u → 857.1428571428577`, v → 142.85714285714226`}}

mat16

DSolve[{k*x''[t] == 0, }, x[t], t]
```

Out[◦]= $\{\{x[t] \to c_1 + t\, c_2\}\}$

In[ ]:=

```
pde = ∂t T[x, t] = k * ∂t^2 T[x, t]
DSolve[pde, T[x, t], {x, t}]
```

Syntax: Incomplete expression; more input is needed .

In[ ]:=

```
Eigenvectors[{{0, 1}, {1, -2 h}}]
Eigenvalues[{{0, 1}, {1, -2 h}}]
Norm[{{0, 1}, {1, -h}}, 1]
Norm[{{0, 1}, {1, -h}}, 2]
```

Out[ ]= $\left\{\left\{h - \sqrt{1 + h^2}, 1\right\}, \left\{h + \sqrt{1 + h^2}, 1\right\}\right\}$

Out[ ]= $\left\{-h - \sqrt{1 + h^2}, -h + \sqrt{1 + h^2}\right\}$

Out[ ]= Max[1, 1 + Abs[h]]

Out[ ]= $\text{Max}\left[\frac{\sqrt{2 + h\,\text{Conjugate}[h] - \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}, \frac{\sqrt{2 + h\,\text{Conjugate}[h] + \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}\right]$

```
Inverse[{{-λ1, -λ2}, {1, 1}}]
Inverse[{{1, 1}, {λ1, λ2}}]
```

$\left\{\left\{\frac{1}{-\lambda_1 + \lambda_2}, \frac{\lambda_2}{-\lambda_1 + \lambda_2}\right\}, \left\{-\frac{1}{-\lambda_1 + \lambda_2}, -\frac{\lambda_1}{-\lambda_1 + \lambda_2}\right\}\right\}$

$\left\{\left\{\frac{\lambda_2}{-\lambda_1 + \lambda_2}, -\frac{1}{-\lambda_1 + \lambda_2}\right\}, \left\{-\frac{\lambda_1}{-\lambda_1 + \lambda_2}, \frac{1}{-\lambda_1 + \lambda_2}\right\}\right\}$

In[ ]:= $\text{Max}\left[\frac{\sqrt{2 + h\,\text{Conjugate}[h] - \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}, \frac{\sqrt{2 + h\,\text{Conjugate}[h] + \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}\right]$

$-h - \text{Sqrt}\left[1 + h^2\right] == -1$

Out[ ]= $\text{Max}\left[\frac{\sqrt{2 + h\,\text{Conjugate}[h] - \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}, \frac{\sqrt{2 + h\,\text{Conjugate}[h] + \sqrt{h}\,\sqrt{\text{Conjugate}[h]}\,\sqrt{4 + h\,\text{Conjugate}[h]}}}{\sqrt{2}}\right]$

In[∘]:=

```
{{-λ1, -λ2}, {1, 1}}.{{λ1^k, 0}, {0, λ2^k}}.{{1/(-λ1+λ2), λ2/(-λ1+λ2)}, {-1/(-λ1+λ2), -λ1/(-λ1+λ2)}}
```

$$\{\{-\frac{\lambda_1^{1+k}}{-\lambda_1+\lambda_2}+\frac{\lambda_2^{1+k}}{-\lambda_1+\lambda_2}, -\frac{\lambda_1^{1+k}\lambda_2}{-\lambda_1+\lambda_2}+\frac{\lambda_1\lambda_2^{1+k}}{-\lambda_1+\lambda_2}\}, \{\frac{\lambda_1^k}{-\lambda_1+\lambda_2}-\frac{\lambda_2^k}{-\lambda_1+\lambda_2}, \frac{\lambda_1^k\lambda_2}{-\lambda_1+\lambda_2}-\frac{\lambda_1\lambda_2^k}{-\lambda_1+\lambda_2}\}\}$$

Out[∘]=

In[∘]:=

```
Lim[{{-(λ1^(1+k)/(-λ1+λ2)) + λ2^(1+k)/(-λ1+λ2), -((λ1^(1+k) λ2)/(-λ1+λ2)) + (λ1 λ2^(1+k))/(-λ1+λ2)},
  {λ1^k/(-λ1+λ2) - λ2^k/(-λ1+λ2), (λ1^k λ2)/(-λ1+λ2) - (λ1 λ2^k)/(-λ1+λ2)}}, k → ∞]
```

Out[∘]=

```
Lim[{{-(λ1^(1+k)/(-λ1+λ2)) + λ2^(1+k)/(-λ1+λ2), -((λ1^(1+k) λ2)/(-λ1+λ2)) + (λ1 λ2^(1+k))/(-λ1+λ2)},
  {λ1^k/(-λ1+λ2) - λ2^k/(-λ1+λ2), (λ1^k λ2)/(-λ1+λ2) - (λ1 λ2^k)/(-λ1+λ2)}}, k → ∞]
```

In[∘]:=

```
Norm[{{0, 1}, {1, -4}}, 1]
```

Out[∘]= 5

```
Plot[{Norm[{{0, 1}, {1, -2 d}}, 2], Norm[{{0, 1}, {1, -2 d}}, 1]},
 {d, 0, 10}, PlotLegends → "Expressions"]
```

Out[∘]=