Evidence of H_1, $P(D \mid H_1)$

In[121]:= `Clear[x, y, t, w1, w0]`

In[122]:= `data = {{-8, 8}, {-2, 10}, {6, 11}};`

In[123]:= `y = w0 + w1 x;`

In[124]:= $w1 = 0; \int_{-\infty}^{\infty} \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(y-t)^2}{2}\right] \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(w0)^2}{2}\right] dw0$

In[126]:= $\frac{e^{-\frac{t^2}{4}}}{2\sqrt{\pi}}$ `/. t → {8, 10, 11} // N`

Out[126]= $\{3.17456 \times 10^{-8},\ 3.91772 \times 10^{-12},\ 2.05583 \times 10^{-14}\}$

In[127]:= ``L1 = {3.1745586679666396`*^-8, 3.917716632754334`*^-12, 2.0558290113157305`*^-14};``

In[128]:= `evidence1 = Product[L1[[i]], {i, 1, 3}]`

Out[128]= 2.55684×10^{-33}

Evidence of H_2, $P(D \mid H_2)$

In[129]:= `Clear[w0, w1, x, y, t]`

In[132]:= `y = w0 + w1 x;`

In[135]:= $\sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(t-y)^2}{2}\right] \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-w1^2}{2}\right] \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(w0)^2}{2}\right]$

Out[135]= $\frac{e^{-\frac{w0^2}{2}-\frac{w1^2}{2}-\frac{1}{2}(t-w0-w1\,x)^2}}{2\sqrt{2}\,\pi^{3/2}}$

In[136]:= $\int_{-\infty}^{\infty}\int_{-\infty}^{\infty} \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(t-y)^2}{2}\right] \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-w1^2}{2}\right] \sqrt{\frac{1}{2\pi}}\, \mathrm{Exp}\left[\frac{-(w0)^2}{2}\right] dw1\, dw0$

Out[136]= $\mathrm{ConditionalExpression}\left[\frac{e^{-\frac{t^2}{4+2x^2}}}{\sqrt{2\pi}\sqrt{1+x^2}\sqrt{1+\frac{1}{1+x^2}}},\ \mathrm{Re}\left[\frac{1}{1+x^2}\right] \geq -1\right]$

In[138]:= $\frac{e^{-\frac{t^2}{4+2x^2}}}{\sqrt{2\pi}\sqrt{1+x^2}\sqrt{1+\frac{1}{1+x^2}}}$ `/. {{x → -8, t → 8}, {x → -2, t → 10}, {x → 6, t → 11}} // N`

Out[138]= {0.0302393, 0.0000391484, 0.0131697}

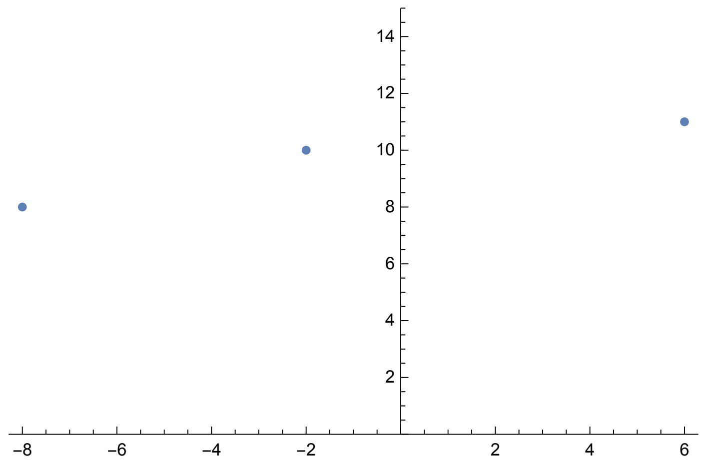
In[139]:= ``L2 = {0.03023925424859377`, 0.00003914837665445475`, 0.013169695605323387`};``

In[140]:=
```
evidence2 = Product[L2[[i]], {i, 1, 3}]
```
Out[140]= 1.55905×10^{-8}

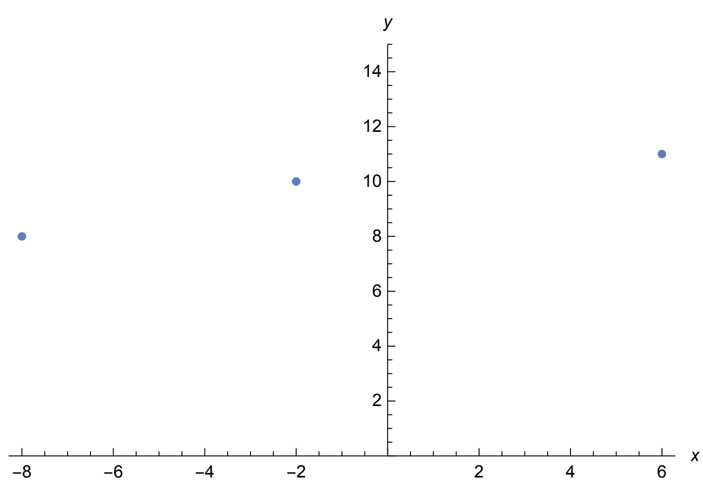
Linear Regression and evidence from the best fit

In[38]:=
```
data = {{-8, 8}, {-2, 10}, {6, 11}}
```
Out[38]= {{-8, 8}, {-2, 10}, {6, 11}}

In[115]:=
```
P1 = ListPlot[data, PlotRange → {0, 15}]
```
Out[115]=



In[116]:=
```
Show[P1, AxesLabel → {HoldForm[x], HoldForm[y]},
 PlotRange → {0, 15}, PlotLabel → None, LabelStyle → {GrayLevel[0]}]
```
Out[116]=

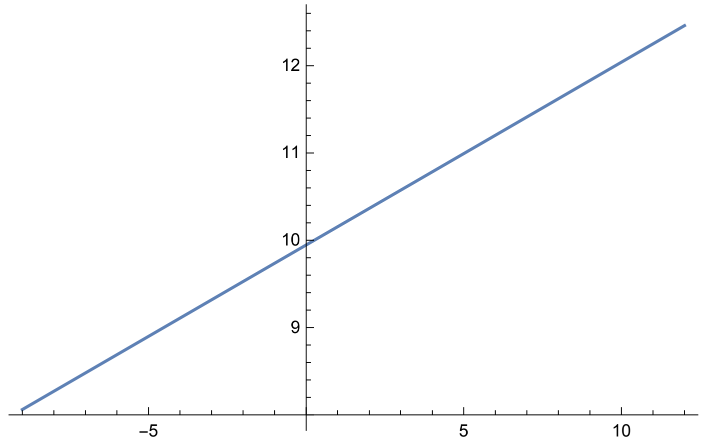


In[54]:=
```
model = LinearModelFit[data, x, x]
```
Out[54]= FittedModel[9.94595 + 0.209459 x]

In[40]:=
```
model["BestFit"]
```
Out[40]= 9.94595 + 0.209459 x

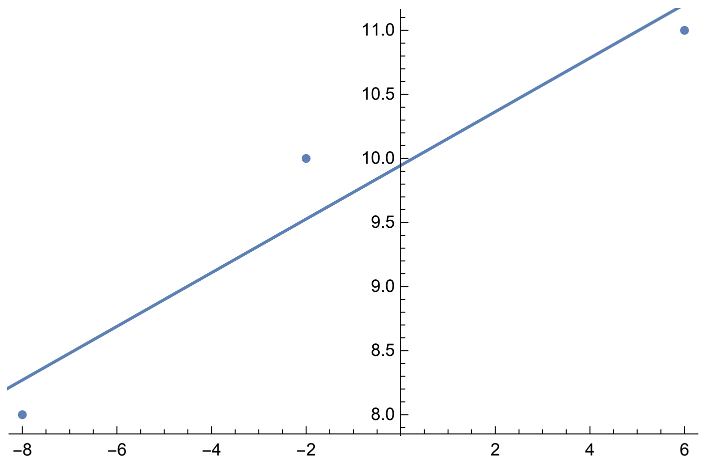
In[74]:= `P2 = Plot[9.945945945945946` + 0.20945945945945946` x, {x, -9, 12}]`

Out[74]=



In[75]:= `Show[P1, P2]`

Out[75]=



In[78]:= `9.945945945945946` + 0.20945945945945946` x /. x → {-8, -2, 6}`

Out[78]= {8.27027, 9.52703, 11.2027}

In[79]:= `{8.27027027027027`, 9.527027027027026`, 11.202702702702702`} - {8, 10, 11}`

Out[79]= {0.27027, −0.472973, 0.202703}

In[141]:= $\frac{1}{2\,\pi}$ **Exp**$\left[-(\delta)^2\right]$ $\frac{1}{2\,\pi}$ /.
    δ → {0.2702702702702702`, -0.4729729729729737`, 0.20270270270270174`} // N

Out[141]= {0.023546, 0.0202529, 0.0243106}

In[104]:= `L0 = {0.02354598051605746`, 0.02025289432564488`, 0.0243106070806057`};`

In[142]:= `evidence0 = Product[L0[[i]], {i, 1, 3}]`

Out[142]= 0.0000115931

Ratio of evidences

In[143]:= $\dfrac{\textbf{evidence0}}{\textbf{evidence1}}$

Out[143]= 4.53415×10^{27}

In[144]:= $\dfrac{\textbf{evidence0}}{\textbf{evidence2}}$

Out[144]= 743.6

In[145]:= $\dfrac{\textbf{evidence2}}{\textbf{evidence1}}$

Out[145]= 6.09758×10^{24}