Interpolación de Lagrange

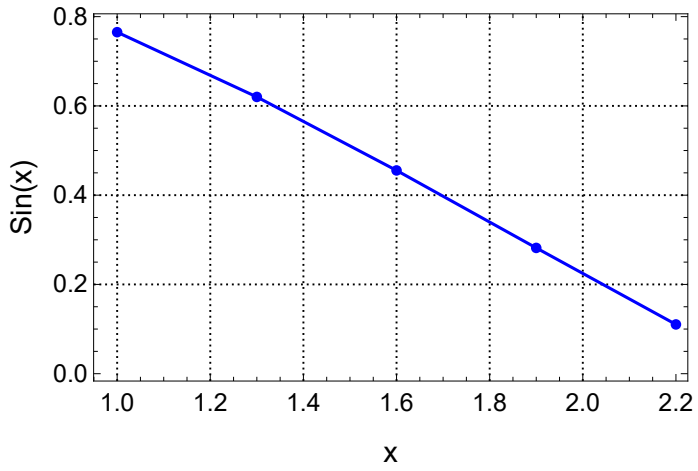
Generación de puntos

In[37]:=
```
a = 1; b = 2.2;
datos = {{1, 0.7651977}, {1.3, 0.6200860},
  {1.6, 0.4554022}, {1.9, 0.2818186}, {2.2, 0.1103623}}
```

Out[38]= {{1, 0.765198}, {1.3, 0.620086}, {1.6, 0.455402}, {1.9, 0.281819}, {2.2, 0.110362}}

In[39]:=
```
ListLinePlot[datos,
 PlotTheme → "Monochrome", FrameLabel → {Style["x", 15], Style["Sin(x)", 15]},
 BaseStyle → FontSize → 13, PlotRangePadding → Automatic,
 GridLines → Automatic, Frame → True, PlotRange → All, PlotStyle → {Blue}
]
```

Out[39]=



Base de Lagrange

In[40]:=
```
LagrangeBaseElements[xs_, i_] :=
  Table[If[i ≠ j, (x - xs[[j + 1]]) / (xs[[i + 1]] - xs[[j + 1]]), 1], {j, 0, Length[xs] - 1}];
LagrangeBase[xs_, i_] := Apply[Times, LagrangeBaseElements[xs, i]];
```

L0

In[47]:=
```
l0 = LagrangeBase[datos[[All, 1]], 0]
```

Out[47]= $5.14403\,(-2.2+x)\,(-1.9+x)\,(-1.6+x)\,(-1.3+x)$

L1

In[48]:=
```
l1 = LagrangeBase[datos[[All, 1]], 1]
```
Out[48]=
$$-20.5761\,(-2.2+x)\,(-1.9+x)\,(-1.6+x)\,(-1+x)$$

L2

In[49]:=
```
l2 = LagrangeBase[datos[[All, 1]], 2]
```
Out[49]=
$$30.8642\,(-2.2+x)\,(-1.9+x)\,(-1.3+x)\,(-1+x)$$

L3

In[50]:=
```
l3 = LagrangeBase[datos[[All, 1]], 3]
```
Out[50]=
$$-20.5761\,(-2.2+x)\,(-1.6+x)\,(-1.3+x)\,(-1+x)$$

L4

In[51]:=
```
l4 = LagrangeBase[datos[[All, 1]], 4]
```
Out[51]=
$$5.14403\,(-1.9+x)\,(-1.6+x)\,(-1.3+x)\,(-1+x)$$

In[53]:=
```
datos[[All, 2]]
```
Out[53]=
$$\{0.765198, 0.620086, 0.455402, 0.281819, 0.110362\}$$

In[54]:=
```
interpolacionLagrange =
 0.7651977` * l0 + 0.620086` * l1 + 0.4554022` * l2 + 0.2818186` * l3 + 0.1103623` * l4
```
Out[54]=
$$\begin{aligned}&3.9362\,(-2.2+x)\,(-1.9+x)\,(-1.6+x)\,(-1.3+x)-\\&12.759\,(-2.2+x)\,(-1.9+x)\,(-1.6+x)\,(-1+x)+\\&14.0556\,(-2.2+x)\,(-1.9+x)\,(-1.3+x)\,(-1+x)-\\&5.79874\,(-2.2+x)\,(-1.6+x)\,(-1.3+x)\,(-1+x)+\\&0.567707\,(-1.9+x)\,(-1.6+x)\,(-1.3+x)\,(-1+x)\end{aligned}$$

In[55]:=
```
interpolacionLagrange /. x → 1.5
```
Out[55]=
$$0.51182$$

In[56]:=
```
Show[
 ListLinePlot[datos,
  PlotTheme → "Monochrome", FrameLabel → {Style["x", 15], Style["Sin(x)", 15]},
  BaseStyle → FontSize → 13, PlotRangePadding → Automatic,
  GridLines → Automatic, Frame → True, PlotRange → All, PlotStyle → {Blue}
 ],
 Plot[interpolacionLagrange, {x, a, b}, PlotStyle → Red]
]
```

Out[56]=