P2

PRACTICE 2: REPRESENTATION OF CURVES IN EXPLICIT FORM

▼ Proposed Exercise P-2.1

Given the following curves:

$y=\sin 2x;\ y=\sin^2 x$

a) Make their graphical representation using the same axes.

b) Plot each of the curves using a different colour.

c) Put a label to each of the functions in order to identify them.

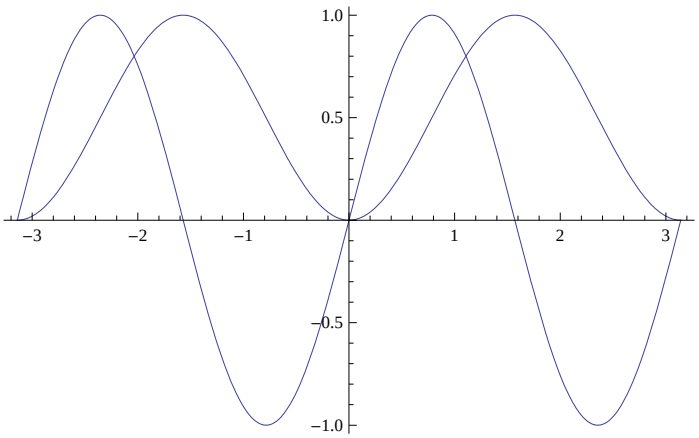
▼ Resolution P-2.1

★ a) Function definition and graphical representation

```
Clear["Global`*"]
f1[x_] = Sin[2 * x]; f2[x_] = Sin[x]^2;

g1 = Plot[f1[x], {x, -Pi, Pi}];
g2 = Plot[f2[x], {x, -Pi, Pi}];

Show[{g1, g2}]
```



★ b) Plotting each of the curves using a different colour

```
g1 = Plot[f1[x], {x, -Pi, Pi}, PlotStyle → {Thickness[0.01], Purple}];
g2 = Plot[f2[x], {x, -Pi, Pi}, PlotStyle → {Thickness[0.01], Orange}];
```

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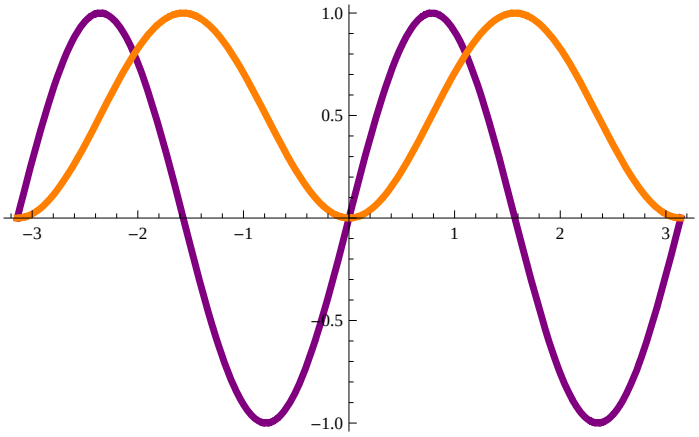
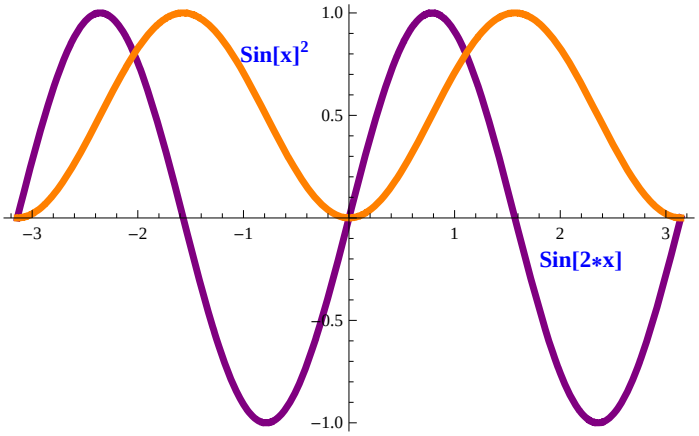
```
graph1 = Show[{g1, g2}]
```



★ c) Inserting labels

```
Show[{g1, g2}, Epilog → {Text[Style["Sin[2*x]", Medium, Bold, Blue], {2.2, -0.2}],
   Text[Style["Sin[x]^2", Medium, Bold, Blue], {-0.7, 0.8}]}]
```



▼ Proposed Exercise P-2.2

a) Define the functions sin(x), sin(x) + 1 and sin(x) + 2.
b) Use the same axes in their graphical representation. Abscises takes values between - π and π, fill the space between the first and the second function using a colour, and the space between the second and third function using a different colour.

▼ Resolution P-2.2

★ a) Function definition

```
f1[x_] = Sin[x]; f2[x_] = Sin[x] + 1; f3[x_] = Sin[x] + 2;
```

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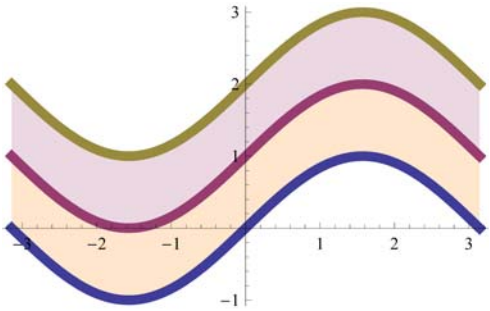
★ b) Function graphical representation in the same axis

```
graph2 = Plot[{f1[x], f2[x], f3[x]}, {x, -Pi, Pi},
  PlotStyle → Thickness[0.02], Filling → {{1 → {{2}, LightOrange}}, {2 → {3}}}]
```



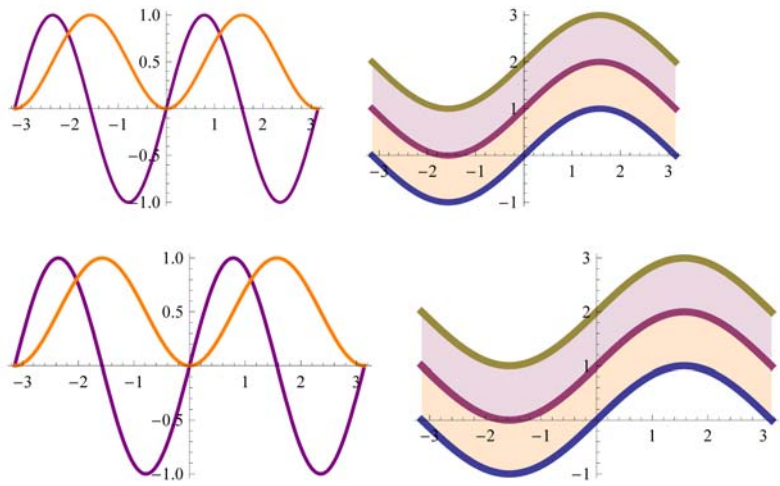
▼ Proposed Exercise P-2.3

a) Plot the figures obtained in the sections 2.1 and 2.2 in the same row.
b) Plot the figures obtained in the sections 2.1 and 2.2 in the same column.

▼ Resolution P-2.3

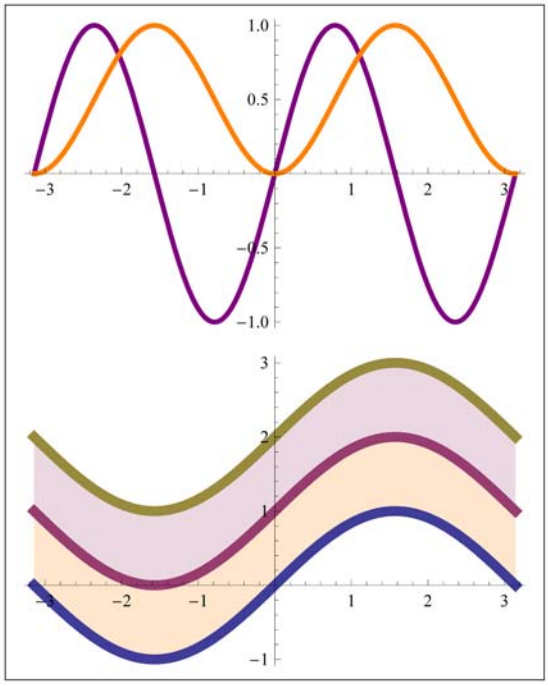
★ a) Graphical representation in the same row

```
GraphicsGrid[{{graph1, graph2}}]
```



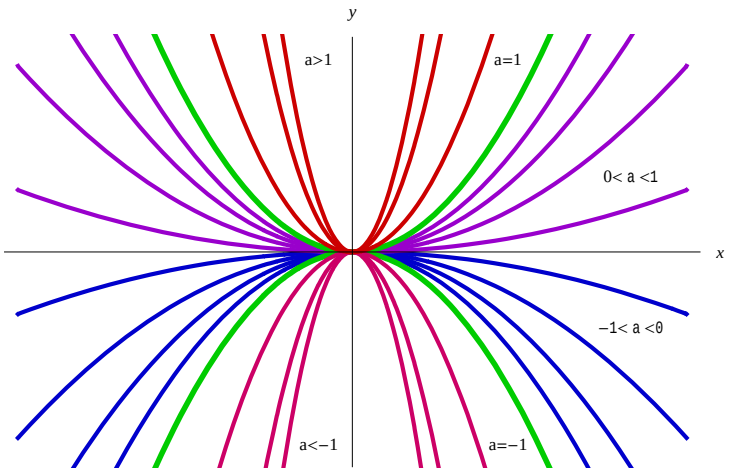
★ b) Graphical representation in the same column

```
GraphicsGrid[{{graph1}, {graph2}}, Frame → True]
```



▼ Proposed Exercise P-2.4

Obtain the next figure:



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▼ Resolution P-2.4

The parabolas that are symmetric to the OY axis having their vertex in the origin have the next formula: $y = ax^2$

```
f[x_, a_] = a x^2;
g1 = Plot[Evaluate[Table[f[x, a], {a, -0.7, -0.1, 0.2}]], {x, -3, 3},
    PlotStyle → {{RGBColor[0, 0, 0.8], Thickness[0.006]}}, DisplayFunction → Identity];
g2 = Plot[Evaluate[Table[f[x, a], {a, 0.1, 0.7, 0.2}]], {x, -3, 3},
  PlotStyle → {{RGBColor[0.6, 0, 0.8], Thickness[0.006]}}, DisplayFunction → Identity];
g3 = Plot[Evaluate[Table[f[x, a], {a, -1, 1, 2}]], {x, -3, 3},
  PlotStyle → {{RGBColor[0, 0.8, 0], Thickness[0.008]}}, DisplayFunction → Identity];
g4 = Plot[Evaluate[Table[f[x, a], {a, -8.2, -2.2, 3}]], {x, -3, 3},
    PlotStyle → {{RGBColor[0.8, 0, 0.4], Thickness[0.006]}}, DisplayFunction → Identity];
g5 = Plot[Evaluate[Table[f[x, a], {a, 2, 8, 3}]], {x, -3, 3},
  PlotStyle → {{RGBColor[0.8`, 0, 0], Thickness[0.006`]}}, DisplayFunction → Identity];
labels = {Text["-1< a <0", {2.5, -1.1}], Text["0< a <1", {2.5, 1.1}],
  Text["a=-1", {1.4, -2.8}], Text["a=1", {1.4, 2.8}],
  Text["a<-1", {-0.3, -2.8}], Text["a>1", {-0.3, 2.8}]};
Show[g1, g2, g3, g4, g5, PlotRange → {-3, 3}, DisplayFunction → $DisplayFunction,
 AxesLabel → {x, y}, Epilog → Graphics[labels][[1]], Ticks → None]
```